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MOTORBOATS

AND CERTAIN VESSELS PROPELLED BY MACHINERY OTHER THAN BY STEAM, MORE THAN 65 FEET IN LENGTH

APRIL 1941

U. S. DEPARTMENT OF COMMERCE
JESSE H. JONES, Secretary

BUREAU OF MARINE INSPECTION AND NAVIGATION
R. S. FIELD, Director

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PREFACE

The Motorboat Act of June 9, 1910, has been repealed by the Act of Congress, approved on April 25, 1940. The new Act makes mandatory certain safety devices and requires that operators of motorboats carrying passengers for hire be examined and licensed. The Board of Supervising Inspectors of the Bureau of Marine Inspection and Navigation, with the approval of the Secretary of Commerce, is further authorized to prescribe by regulation the number and types of safety devices required on the affected vessels as well as requirements for the licensing of motorboat operators. The new law provides three additional safety requirements, which were not required by the Act of June 9, 1910, namely (1) flame arrestors, (2) ventilation of bilges, and (3) examination and licensing of the operators of motorboats carrying passengers for hire.

The regulations prescribing the number and type of safety devices will, it is believed, serve as a tangible and practical means by which owners, operators and boarding enforcement officers will be enabled to determine readily whether or not affected vessels are equipped in accordance with legal requirements.

In Part 27 of the regulations are set forth the procedures and specifications to be followed by manufacturers in order to obtain approval of the required equipment, which equipment is for use on motorboats and motor vessels covered by these regulations.

The general regulations under the Act of June 9, 1910, are replaced by these regulations which are applicable in whole or in part to the vessels as set forth in Part 24, "General Provisions."

Motorboats or motor vessels which are over 15 gross tons and which carry passengers or freight for hire, are required to have on board at all times, while being operated or navigated, a valid certificate of inspection issued by a Board of Local Inspectors. Prior to the issuance of a certificate of inspection to any such vessel, the vessel is required to be in full compliance with the applicable provisions of these regulations, as well as those provisions of the General Rules and Regulations of the Board of Supervising Inspectors for inspected vessels which are applicable under Section 4426 of the Revised Statutes of the United States.

Included in this publication, but not a part of the regulations, is a section entitled "Recommended Practices for the Care and Safe Operation of Motorcraft." The procedure outlined therein is a compilation of safety practices advocated by leading safety organizations and underwriters throughout the world, and is appended in the interest of promoting safety.

Information concerning the examination and licensing of operators on motorboats carrying passengers for hire and on matters relating to equipment on vessels subject to these regulations may be obtained from the supervising and local inspectors whose addresses are included herein.

Attention is invited to Section 14 of the Act of April 25, 1940, which provides:

> Any person who shall operate any motorboat or any vessel in a reckless or negligent manner so as to endanger the life, limb, or property of any person shall be deemed guilty of a misdemeanor and on conviction thereof by any court of competent jurisdiction shall be punished by a fine not exceeding $2,000, or by imprisonment for a term of not exceeding one year, or by both such fine and imprisonment, at the discretion of the court.

TITLE 46—SHIPPING

Chapter I—Bureau of Marine Inspection and Navigation

SUBCHAPTER C—MOTORBOATS, AND CERTAIN VESSELS PROPELLED BY MACHINERY OTHER THAN BY STEAM MORE THAN 65 FEET IN LENGTH

Part 24.—GENERAL PROVISIONS

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24.1 Basis.—The regulations in this subchapter, except Part 29, are prescribed by the Board of Supervising Inspectors and approved by the Secretary of Commerce under authority of the Act of Congress, approved April 25, 1940 (54 Stat. 163–167; 46 U.S.C. 526–526t).

24.2 Application.—The regulations contained in Parts 24–28 inclusive, hereinafter referred to as these regulations, are applicable to all vessels, American and foreign, with power-driven propulsion machinery temporarily or permanently installed or attached on board while on the navigable waters of the United States, except:

(*a*) Tugboats and towboats propelled by steam.

(*b*) Vessels propelled by steam more than 65 feet in length.

(*c*) Vessels having on board inflammable or combustible liquid cargo in bulk.

(*d*) Vessels subject to the International Convention for Safety of Life at Sea, 1929, carrying or certificated to carry more than 12 passengers on an international voyage by sea, as defined in said Convention.

(*e*) Seagoing vessels of 300 gross tons and over propelled by internal-combustion engines subject to inspection and certification by a board of local inspectors.

24.3 Division of regulations.—The regulations are divided into four major parts, as follows:

PART 25.—Requirements for all motorboats, except those of more than 15 gross tons carrying passengers for hire.

PART 26.—Requirements for all motor vessels, except those of more than 15 gross tons carrying passengers for hire.

PART 27.—Requirements for all motorboats and motor vessels of more than 15 gross tons carrying passengers for hire.

PART 28.—Specifications and procedure for approval of equipment.

24.4 Intent.—It is the intent of these regulations to prescribe requirements making effective the provisions of the Act of April 25, 1940, with respect to navigation lights, whistles, bells, lifesaving devices, fire extinguishers, backfire traps, engine-room and fuel-tank-compartment ventilation, and the examination and licensing of operators of motorboats carrying passengers for hire.

24.5 Inspection of steam-propelled motorboats.—The local inspectors shall approve the design of the engine, boiler, or other operating machinery and shall inspect same annually on all motorboats which are more than 40 feet in length and which are propelled by machinery driven by steam, in accordance with the applicable provisions of subchapter F. When the local inspectors approve the design of the engine, boilers, or other operating machinery, a letter of approval to that effect shall be issued. When the local inspectors at an annual inspection approve the condition of the engine, boiler, or other operating machinery, a letter of approval to that effect shall also be issued, and such letter of approval shall be posted on the vessel under glass.

24.6 Effective dates, general application.—The effective dates and general application of the various requirements of the regulations are as follows:

(*a*) The regulations with respect to the inspection of engines, boilers, or other operating machinery, and the approval of the design thereof, are applicable to all vessels propelled by machinery driven by steam, more than 40 feet and not over 65 feet in length.

(*b*) The regulations with respect to life preservers, and other lifesaving devices, are effective on and after April 25, 1941, and applicable to all vessels.

(*c*) The regulations with respect to ventilating systems for bilges of the engine and fuel tank compartments are applicable to all vessels constructed or decked over on or after April 25, 1940.

(*d*) The regulations with respect to flame arrestors, backfire traps, or other similar devices on the carburetors of all gasoline engines are applicable to all vessels, the construction of which or the replacement of the engines of which is begun on or after April 25, 1940.

Exemption.—Backfire-arresting requirements are not applicable to outboard motors.

(*e*) The regulations with respect to fire-extinguishing equipment are effective on and after April 25, 1941, and are applicable to all vessels.

Exemption.—Fire extinguishing equipment requirements are not applicable to motorboats propelled by outboard motors not carrying passengers for hire.

(*f*) The regulations with respect to navigation lights are applicable to all vessels of 65 feet or less in length.[1]

(*g*) The regulations with respect to whistles or other sound-producing mechanical devices are applicable to all vessels 16 feet or over and not more than 65 feet in length.[1]

[1] The regulations with respect to navigation lights, whistles, and bells are applicable on all waters inside the line prescribed by the Secretary of Commerce dividing the inland waters from the high seas.

Exemptions.—Whistles or other sound-producing devices are not required on (1) motorboats less than 16 feet in length and (2) boats propelled by outboard motors while competing in a race previously arranged and announced, or while engaged in navigation incident to tuning up for a race.

(*h*) The regulations with respect to bells are applicable to all vessels 26 feet or over and not more than 65 feet in length.[1]

Exemptions.—Bell requirements are not applicable to (1) motorboats less than 26 feet in length, and (2) boats propelled by outboard motors while competing in a race previously arranged and announced, or while engaged in navigation incident to the tuning up for a race.

(*i*) The regulations with respect to motorboat operators' licenses are effective on and after April 25, 1941, and are applicable to all operators of motorboats carrying passengers for hire.

Exemption.—Licensed operators are not required on motorboats carrying passengers for hire while engaged in fishing contests previously arranged and announced.

24.7 Penalties.—If any motorboat or motor vessel subject to any of the provisions of the Act of April 25, 1940 (54 Stat. 163–167; 46 U.S.C. 526–526t), is operated or navigated in violation of said Act or any of these regulations, the owner or operator, either one or both of them, shall, in addition to any other penalty prescribed by law than that contained in section 14 of said Act, be liable to a penalty of $100: *Provided*, That in the case of motorboats or vessels subject to the provisions of said Act carrying passengers for hire, a penalty of $200 shall be imposed on the owner or operator, either one or both of them, thereof for any violation of section 6, 7, or 8 [2] of said Act or of any of the regulations pertaining thereto. For any penalty incurred under section 16 of said Act, the motorboat or vessel shall be held liable and may be proceeded against by way of libel in the district court of any district in which said motorboat or vessel may be found.

24.8. Procedure for mitigation or remission of fines or penalties.—The Secretary of Commerce or any officer of the Department of Commerce authorized by the Secretary of Commerce may, upon application therefor, remit or mitigate any fine, penalty, or forfeiture incurred under the Act of April 25, 1940, or any of these regulations except the penalties provided for in section 14 of said Act. The application should be in such form and filed in such manner as prescribed by the Secretary.

24.9. Boarding officers.—Officers duly authorized to enforce the navigation laws of the United States are authorized to board all motorboats and motor vessels for the purpose of determining and reporting violations of the Act of April 25, 1940, and these regulations.

[1] The regulations with respect to navigation lights, whistles, and bells are applicable on all waters inside the line prescribed by the Secretary of Commerce dividing the inland waters from the high seas.

[2] Sections 6, 7, and 8 require, respectively, life preservers, licensed operators for motorboats carrying passengers for hire, and fire extinguishers.

24.10. Definition of terms.—Certain terms used in these regulations are defined as follows:

(*a*) *Motorboat.*—Any vessel 65 feet in length or less which is subject to these regulations.

(1) *Class A.*—Any motorboat less than 16 feet in length.

(2) *Class 1.*—Any motorboat 16 feet or over and less than 26 feet in length.

(3) *Class 2.*—Any motorboat 26 feet or over and less than 40 feet in length.

(4) *Class 3.*—Any motorboat 40 feet or over and not more than 65 feet in length.

(*b*) *Motor vessel.*—Any vessel more than 65 feet in length which is subject to these regulations.

(*c*) *All vessels.*—Motorboats and motor vessels which are subject to these regulations.

(*d*) *Approved.*—Approved by the Board of Supervising Inspectors, Bureau of Marine Inspection and Navigation, United States Department of Commerce.

(*e*) *Board.*—The Board of Supervising Inspectors of the Bureau of Marine Inspection and Navigation, United States Department of Commerce.

(*f*) *Bureau.*—Bureau of Marine Inspection and Navigation, United States Department of Commerce.

(*g*) *Director.*—Director of the Bureau of Marine Inspection and Navigation.

(*h*) *Supervising Inspector.*—Supervising Inspector of the Bureau of Marine Inspection and Navigation.

(*i*) *Local Inspectors.*—Board of Local Inspectors of the Bureau of Marine Inspection and Navigation.

(*j*) *Length.*—Length measured from end to end over the deck, excluding sheer.

(*k*) *Portable fire extinguisher.*—Any type which is entirely portable and the gross weight of which, fully charged, does not exceed 55 pounds; also any type exceeding 55 pounds in weight which is equipped with suitable hose and nozzle on reel or other practicable means for reaching any part of the space protected.

(*l*) *Carrying passengers for hire.*—The carriage of any person or persons by a vessel for a valuable consideration, whether directly or indirectly flowing to the owner, charterer, operator, agent or any other person interested in the vessel.

(*m*) *Carrying freight for hire.*—The carriage of any goods, wares, or merchandise or any other freight for a valuable consideration whether directly or indirectly flowing to the owner, charterer, operator, agent, or any other person interested in the vessel.

(*n*) *Bell.*—Any device which produces, when struck, a clear bell-like tone of full round characteristics for sounding bell signals.

Part 25.—REQUIREMENTS FOR ALL MOTORBOATS EXCEPT THOSE OF OVER 15 GROSS TONS CARRYING PASSENGERS FOR HIRE

NAVIGATION LIGHTS

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NAVIGATION LIGHTS

25.1–1 When carried and exhibited.—Every motorboat in all weathers from sunset to sunrise shall carry and exhibit the following lights when under way, and during such time no other lights which may be mistaken for those prescribed shall be exhibited.

25.1–2 Classes A and 1.—Every motorboat of classes A and 1 shall carry the following lights:

(*a*) A bright white light aft to show all around the horizon.

(*b*) A combined lantern in the fore part of the vessel and lower than the white light aft, showing green to starboard and red to port, so fixed as to throw the light from right ahead to 2 points abaft the beam on their respective sides.

25.1–3 Classes 2 and 3.—Every motorboat of classes 2 and 3 shall carry the following lights:

(*a*) A bright white light in the fore part of the vessel as near the stem as practicable, so contructed as to show an unbroken light over an arc of the horizon of 20 points of the compass, so fixed as to throw the light 10 points on each side of the vessel; namely, from right ahead to 2 points abaft the beam on either side.

(*b*) A bright white light aft to show all around the horizon and higher than the white light forward.

(*c*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to 2 points abaft the beam on the starboard side. On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to 2 points abaft the beam on the port side. The said side lights shall be fitted with inboard screens of sufficient length and height or shall be mounted on cabin sides and so set as to prevent these lights from being seen across the bow.

25.1–4 Under sail and machinery.—All motorboats propelled by sail and machinery or by sail alone shall carry and exhibit the following lights:

(*a*) Motorboats of classes A and 1 when propelled by sail and machinery or by sail alone shall carry the white light prescribed by subsection 25.1–2 (*a*) but not the combined lantern prescribed by 25.1–2 (*b*).

(*b*) Motorboats of classes 2 and 3 when propelled by sail and machinery or by sail alone shall carry the colored side lights prescribed by subsection 25.1–3 (*c*) but not the white lights prescribed by subsection 25.1–3 (*a*) and (*b*).

(*c*) In addition, motorboats of all classes when so propelled shall carry ready at hand a lantern or flashlight showing a white light which shall be exhibited in sufficient time to avert collision.

25.1–5 Visibility.—Every white light prescribed by these regulations shall be of a character as to be visible at a distance of at least 2 miles. Every colored light prescribed by these regulations shall be of such character as to be visible at a distance of at least 1 mile. The word "visible" when applied to lights shall mean visible on a dark night with clear atmosphere.

25.1–6 Approved lights.—On and after April 24, 1943, navigation lights installed, fitted, or replaced on motorboats shall be of an approved type: *Provided*, That navigation lights installed, fitted, or replaced on a motorboat prior to April 25, 1943, may be continued in service on said motorboat provided they are of such character, and so located, arranged, and illuminated as to comply with the requirements in this part: *Provided further*, That any such navigation lights temporarily removed and later placed in the position from which removed on any such motorboat shall not be considered as an installation, fitting, or replacement.

Whistles or Other Sound-Producing Devices

25.2–1 Where required.—(a) Motorboats shall be provided with an efficient whistle, horn, or other sound-producing mechanical device as follows:

(1) Class A. None.

(2) Class 1. Mouth-, hand-, or power-operated, capable of producing a blast of 2 seconds' or more duration and audible for a distance of at least one-half mile.

(3) Class 2. Hand or power-operated, capable of producing a blast of 2 seconds' or more duration and audible for a distance of at least 1 mile.

(4) Class 3. Power-operated, capable of producing a blast of 2 seconds' or more duration and audible for a distance of at least 1 mile.

(5) Commercial fishing motorboats may carry any device specified in this section.

(*b*) Whistles or other sound-producing mechanical devices which comply with the requirement in effect on April 24, 1940, may be continued in service until April 25, 1943, if such equipment is in good and serviceable condition.

Fog Bell

25.3–1 Where required.—Motorboats shall be provided with a bell which produces, when struck, a clear bell-like tone of full round characteristics, for sounding bell signals according to class as follows:

(*a*) Classes A and 1. None.

(*b*) Classes 2 and 3. One such bell.

Life Preservers or Other Lifesaving Devices

25.4–1 Number and type required.—After April 24, 1941, all motorboats shall carry a lifesaving device for each person on board as follows:

(*a*) Motorboats which carry passengers for hire shall carry an approved life preserver for each person on board.

(*b*) Motorboats of over 15 gross tons carrying freight for hire shall carry one approved life preserver for each person on board.

(*c*) Motorboats of class 3 not carrying passengers for hire shall carry an approved life preserver or ring buoy for each person on board.

(*d*) All other motorboats not provided for in this section or section 25.4–3 shall carry an approved life preserver, ring buoy, or buoyant cushion for each person on board.

25.4–2 Existing equipment.—All life preservers, buoyant cushions, or ring buoys which are permitted by section 25.4–1 and which comply with the requirements of the regulations in effect on April 24, 1941, may be continued in service until April 25, 1943, if such equipment is in good and serviceable condition.

25.4–3 Commercial fishing motorboats—Life-floats.—Wooden life-floats made of light buoyant wood may be used on commercial fishing motorboats. The dimensions of every such wooden life-float shall be not less than 4 feet in length, 12 inches in width, and 1¾ inches in thickness, and the weight shall not exceed 25 pounds. The float may be made in one or two pieces. If made in two pieces, the pieces shall be securely attached with wooden dowels. No metal shall be used in the construction of the float. It shall be provided with

two hand-holes, one at each side, midway in the length, which hand-holes shall be not less than 6 inches in length and 2 inches in width, with a margin of at least 1 inch at the edge of the float. Wooden life-floats, made of balsa wood, shall not be less than 3 feet in length, 11½ inches in width, and 2 inches in thickness. The balsa wood used in the construction of such floats shall be of the same quality as required for balsa-wood life preservers. Each two-piece float, in addition to the doweling, shall be securely glued and the dowels shall be four in number, of ¾-inch diameter, made of straight-grained dry hardwood, driven through and entirely across the float through holes bored to slightly less diameter than the dowel.

25.4–4 Stowage.—Lifesaving devices shall be so placed as to be readily accessible.

Fire Extinguishers

25.5–1 Number and type required.—After April 24, 1941, the minimum number and type of approved portable fire extinguishers required on motorboats shall be as set forth in Table I, except that:

(*a*) Motorboats propelled by outboard motors not carrying passengers for hire are not required to carry fire extinguishers.

(*b*) Motorboats of more than 15 gross tons carrying freight for hire shall be provided with the minimum number and type of fire extinguishers as set forth in Part 26.

Table I

Class of motorboat	Number of extinguishers	Boats fitted with fixed CO_2 system [1]
A	1	0
1	1	0
2	2	1
3	3	2

[1] To secure this reduction, the fixed carbon-dioxide system fitted must be of an approved type and installed and maintained in accordance with the provisions of these regulations covering such systems.

The extinguishing units required by Table I shall be of any of the following approved types and capacities: 1¼-gallon foam; 4-pound carbon dioxide; 1-quart carbon-tetrachloride. On boats of class 3, the approved extinguishers required, may, in the case of the foam and carbon-dioxide type, be of larger capacity, i. e., 2½-gallon foam or 15-pound carbon dioxide and provided in the ratio of one larger unit for two of the units required by Table I.

25.5–2 Existing equipment.—Motorboats having on board fire extinguishers of the type which complied with the requirements in effect on April 24, 1941, and which are in good and serviceable condition are not required to carry approved fire extinguishers until after April 24, 1943.

25.5–3 Location and condition.—Fire extinguishers shall be at all times kept in condition for immediate and effective use and shall be so placed as to be readily accessible.

Carburetor Backfire Flame Arrester

25.6-1 Where required.—The carburetor(s) of every engine installed on all motorboats after April 25, 1940, which use gasoline as fuel, except outboard motors, shall be fitted with an approved device which has demonstrated its ability to arrest backfire.

Ventilation

25.7-1 Where required.—All motorboats which are constructed or decked over after April 24, 1940, and which use gasoline or other liquid fuel having a flash point of less than 110° F. shall be provided with ventilation as follows:

(*a*) At least two ventilators fitted with cowls or their equivalent for the purpose of properly and efficiently ventilating the bilges of every engine and fuel-tank compartment in order to remove any inflammable or explosive gases.

(*b*) Motorboats constructed so that the greater portion of the bilges under the engine and fuel tanks are open and exposed to the natural atmosphere at all times are not required to be fitted with ventilators.

Licensed Operators

25.8–1 New operators' licenses.—(*a*) After April 24, 1941, no motorboat while carrying passengers for hire shall be operated or navigated except in charge of a person duly licensed for such service as provided in these regulations.

(*b*) All licenses issued to motorboat operators under the Act of June 9, 1910, permitting them to operate or navigate motorboats carrying passengers for hire become null and void on April 24, 1941.

25.8–2 Eligibility for license.—Any person who has attained the age of 18 years and is qualified in all other respects, shall be considered eligible and may be examined by the local inspectors for such license.

25.8–3 Authority of supervising inspectors.—Each supervising inspector shall have full power in any district in which there is no board of local inspectors or in any district where by reason of distance or other cause, it is inconvenient to resort to the local inspectors to examine and issue motorboat operators' licenses, and to do and perform all the duties imposed upon the local inspectors by these regulations.

25.8–4 Professional qualifications and examination.—(*a*) An applicant for a license as an operator shall submit a sworn application on Form 866A to the local inspectors and shall be examined orally concerning his character and fitness to hold such license. Thorough inquiry into the proofs which the applicant submits concerning his character and ability shall also be made. If, after such oral examination and investigation, the inspectors consider the applicant's capacity, knowledge, experience, character, and habits of life to be such as to warrant entrusting him with the duties and responsibilities involved in the operation

and navigation of motorboats carrying passengers for hire, a license authorizing him to discharge such duties on any such motorboat for a term of 5 years shall be issued to him: *Provided further*, Licenses issued under these regulations, shall, prior to April 25, 1941, be accepted as valid under the provisions of the Act of June 9, 1910, regarding licensed operators.

(*b*) The examination given by the local inspectors will be oral, and will be based upon the subjects which a person operating a motorboat carrying passengers should know before being entrusted with the operation or navigation of such motorboat.

(*c*) The examination will consist of questions on the regulations governing motorboats, the collision regulations applicable to the waters over which the applicant operates, fire protection and extinguishment, lifesaving equipment, the operation of propelling machinery and, particularly, the safe and proper handling of gasoline motors, the proper method of operating and navigating motorboats carrying passengers, and simple first-aid.[3] Although applicants will be examined only in the collision regulations applicable to the waters upon which they are operating it will be incumbent upon them, should they at any time operate on waters for which the collision regulations differ, to familiarize themselves with the appropriate rules.

25.8–5 Physical qualifications.—Applicants for an operator's license under these regulations shall be examined to determine their physical fitness in accordance with the following:

(*a*) An applicant who has operated a motorboat carrying passengers for hire under authority of a license issued prior to April 25, 1941, may, if it appears to the inspectors that his color sense, vision, hearing, and physical fitness are not badly impaired, be issued an operator's license without further physical examination.

(*b*) An applicant who has not operated a motorboat carrying passengers for hire under authority of a license issued prior to April 25, 1941, shall be examined by a United States Public Health surgeon or a reputable physician to determine whether he is physically fit to perform the duties required of him.

(*c*) Epilepsy, insanity, senility, acute venereal disease, neurosyphilis, or badly impaired hearing, eyesight, or color blindness are causes for rejection.

25.8–6 Preparation of licenses.—Licenses signed by one local inspector only shall not be valid, nor shall the name of any other person be substituted for that of a local inspector or a supervising inspector, and every person receiving a license or certificate of lost license shall sign the same and leave a print of his left thumb upon the back thereof immediately upon its receipt.

25.8–7 Renewal of license.—(*a*) An operator's license may be renewed by application to the inspectors. The presentation of the license to be renewed, together with satisfactory certificate of color sense, shall be considered sufficient evidence upon which to renew a license; unless facts shall have come to the knowledge of the inspectors which would render a renewal improper in the case of a particular applicant.

[3] Two sets of typical examination questions appear on p. C–65.

(*b*) No license shall be renewed more than 30 days in advance of the date of the expiration thereof, unless there are extraordinary circumstances that shall justify a renewal beforehand, in which case the reasons therefor must appear in detail upon the records of the inspectors renewing the license; nor shall any license be renewed unless it is presented within 1 year after the date of its expiration.

(*c*) Whenever an operator shall apply for renewal of his license more than 1 year after the date of its expiration, he shall be required to pass an examination.

25.8–8 Lost license.—(*a*) In case of loss of license from any cause, except as stated in section 25.8–9, the inspectors, upon receiving satisfactory evidence of such loss and a record of the lost license from the inspectors that issued same, shall issue a certificate to the owner thereof which shall have the authority of the lost license for the unexpired term. In all cases the certificates of lost license shall state the board that issued the lost license.

(*b*) Whenever a license is reported to the local inspectors by an operator as having been lost by him or stolen from him, or whenever a license is stolen from an office of local inspectors, the local inspectors shall immediately report the fact to the Director and give a full description of the license and all facts incident to the loss or theft of same. By the same procedure they shall report the recovery of any licenses reported lost, giving the facts incident to their recovery.

25.8–9 Suspension or revocation of license.—(*a*) Motorboat operators' licenses shall be subject to suspension or revocation on the same grounds and with like procedure as is provided in the case of suspension or revocation of licenses under the provisions of Section 4450 of the Revised Statutes, as amended, and any such license shall be subject to revocation or suspension for any acts of incompetency, misbehavior, negligence, unskillfulness, endangering life, or wilfully violating any provision of law or regulations providing for safety. When the license of any operator is revoked, such license shall expire with such revocation, and any license subsequently granted to such person shall be considered as an original license except as to number of issue. Upon the revocation or suspension of the license of any such operator, said license shall be surrendered to the local inspectors.

Part 26.—REQUIREMENTS FOR MOTOR VESSELS EXCEPT THOSE OF MORE THAN 15 GROSS TONS CARRYING PASSENGERS FOR HIRE

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LIFE PRESERVERS

26.2–1 Number and type required.
26.2–2 Stowage.

FIRE EXTINGUISHERS

26.3–1 Number and type required.
26.3–2 Substitutions.
26.3–3 Machinery spaces.
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26.3–7 Existing equipment.

CARBURETOR BACKFIRE FLAME ARRESTER

26.4–1 Where required.

VENTILATION

26.5–1 Where required.

NAVIGATION LIGHTS AND SOUND-PRODUCING DEVICES

26.1–1 Pilot rules applicable.—Motor vessels are subject to the provisions of the pilot rules regarding navigation lights, whistles, bells, and other sound-producing devices applicable to the waters navigated.

LIFE PRESERVERS

26.2–1 Number and type required.—After April 24, 1941, all motor vessels shall carry an approved life preserver for each person on board: *Provided*, That all life preservers, ring buoys or wooden life floats on board vessels which are of a character that met the requirements of the regulations in effect on April 24, 1941, may be continued in service until April 24, 1943, if such equipment is in good and serviceable condition.

26.2–2 Stowage.—Lifesaving devices shall be so placed as to be readily accessible.

FIRE EXTINGUISHERS

26.3–1 Number and type required.—After April 24, 1941, motor vessels shall be provided with approved portable fire extinguishers as follows:

TABLE II

	Minimum number of fire extinguishers
Not over 50 gross tons	1
Over 50 and not over 100 gross tons	2
Over 100 and not over 500 gross tons	3
Over 500 and not over 1,000 gross tons	6
Over 1,000 gross tons	8

Table II is based on the ordinary 2½-gallon foam-type fire extinguisher; other types of fire extinguishers may be substituted according to the following schedule: One 2½-gallon foam

type is equivalent to one 15-pound carbon-dioxide (CO_2) type or two 1-quart carbon-tetrachloride type.

26.3–2 Substitutions.—No reduction in the number of extinguishers required by Table II will be allowed by the substitution of extinguishers of the same type of greater capacity. Fire extinguishers of approved types of less capacity are allowable when their content equals or exceeds the required quantity of extinguishing agent.

26.3–3 Machinery spaces.—In addition to the extinguishers required by Table II, the machinery spaces shall be equipped as follows:

(*a*) One extinguisher of the type specified in section 26.3–1 for each 1,000 brake horsepower of the main engines or fraction thereof. However, not more than six such extinguishers need be carried.

(*b*) On motor vessels over 300 gross tons, one approved 12-gallon foam-type extinguisher or one approved 35-pound carbon-dioxide extinguisher shall be carried.

(*c*) The 12-gallon foam-type extinguisher and the 35-pound CO_2 extinguisher shall be permanently installed single units of a type which may, by simple means and by a single operator, be rapidly put into operation. They shall be equipped with suitable hose and nozzles on reels or other practicable means easy of access and of sufficient length to reach any part of the spaces protected.

26.3–4 Exemptions for fixed systems.—Motor vessels which are fitted with a fixed smothering system of an approved type in the machinery space are exempted from the provisions of section 26.3–3 (*b*).

26.3–5 Location and condition.—Fire extinguishers shall be at all times kept in condition for immediate and effective use and shall be so placed as to be readily accessible.

26.3–6 Inspection.—At least annually all fire extinguishers on motorboats and motor vessels of more than 15 gross tons carrying freight for hire shall be checked under the supervision of the local inspectors as follows:

(*a*) *Carbon-dioxide-type extinguishers.*—Weigh, and if found to be more than 10 percent underweight, same must be recharged.

(*b*) *Foam-type extinguishers.*—Discharge, thoroughly wash out and recharge in accordance with the manufacturer's instructions.

(*c*) *Carbon-tetrachloride extinguishers.*—Examine and operate (fluid may be discharged into clean dry glass or porcelain container and returned to extinguisher).

26.3–7 Existing equipment.—Motor vessels having on board portable fire extinguishers of the type which complied with the requirements in effect on April 24, 1941, and which are in good and serviceable condition are not required to carry approved fire extinguishers until after April 24, 1943.

Carburetor Backfire Flame Arrester

26.4–1 Where required.—The carburetor(s) of every engine installed on all motor vessels after April 25, 1940, which use gasoline as fuel, shall be fitted with an approved device for arresting backfire.

Ventilation

26.5–1 Where required.—All motor vessels which are constructed or decked over after April 25, 1940, and which use gasoline or other liquid fuel having a flash point of less than 110° F., shall be provided with ventilation as follows:

(*a*) At least two ventilators fitted with cowls or their equivalent for the purpose of properly and efficiently ventilating the bilges of every engine and fuel-tank compartment in order to remove any inflammable or explosive gases.

(*b*) Motor vessels constructed so that the greater portion of the bilges under the engine and fuel tanks are open and exposed to the natural atmosphere at all times are not required to be fitted with ventilators.

Part 27.—REQUIREMENTS FOR MOTORBOATS AND MOTOR VESSELS OF MORE THAN 15 GROSS TONS CARRYING PASSENGERS FOR HIRE

NAVIGATION LIGHTS AND SOUND-PRODUCING DEVICES

Sec.
27.1-1 Requirements, all vessels

LIFE PRESERVERS

27.2-1 Number and type required
27.2-2 Stowage

FIRE EXTINGUISHING EQUIPMENT

27.3-1 Number and type required
27.3-2 Substitutions
27.3-3 Machinery spaces
27.3-4 Vessels carrying motor vehicles

FIRE EXTINGUISHING EQUIPMENT—Continued

Sec.
27.3-5 Location and condition
27.3-6 Inspection
27.3-7 Existing equipment

CARBURETOR BACKFIRE FLAME ARRESTER

27.4-1 Where required

VENTILATION

27.5-1 Where required

LICENSED OPERATORS

27.6-1 Requirements

NAVIGATION LIGHTS AND SOUND-PRODUCING DEVICES

27.1-1 Requirements, all vessels.—Motorboats shall comply with the requirements of Part 25 concerning navigation lights, whistles, other sound-producing mechanical appliances, and fog bells. Motor vessels are subject to the provisions of the pilot rules regarding navigation lights, whistles, bells, and other sound-producing devices applicable to the waters navigated.

LIFE PRESERVERS

27.2-1 Number and type required.—On and after April 25, 1941, all motorboats and motor vessels shall carry an approved life preserver for each person on board: *Provided*, That all life preservers on board vessels which are of a character that met the requirements of the regulations in effect on April 24, 1941, may be continued in service until April 24 1943, if such equipment is in good and serviceable condition.

27.2-2 *Stowage.*—Lifesaving devices shall be so placed as to be readily accessible.

FIRE EXTINGUISHING EQUIPMENT

27.3-1 Number and type required.—On and after April 25, 1941, motorboats and motor vessels shall be provided with approved portable fire extinguishers as follows:

TABLE III

	Minimum number of fire extinguishers
Not over 50 gross tons	1
Over 50 and not over 100 gross tons	2
Over 100 and not over 500 gross tons	3
Over 500 and not over 1,000 gross tons	6
Over 1,000 gross tons	8

Table III is based on the ordinary 2½-gallon foam-type fire extinguisher; other types of fire extinguishers may be substituted according to the following schedule: One 2½-gallon foam-type is equivalent to one 15-pound carbon-dioxide (CO_2) type or two 1-quart carbon-tetrachloride type.

27.3–2 Substitutions.—No reduction in the number of extinguishers required by Table III will be allowed by the substitution of extinguishers of the same type of greater capacity. Fire extinguishers of approved types of less capacity are allowable when their content equals or exceeds the required quantity of extinguishing agent.

27.3–3 Machinery spaces.—In addition to the extinguishers required by Table III the machinery spaces of all vessels propelled by internal combustion engines shall be equipped as follows:

(*a*) One extinguisher of the type specified in section 27.3–1 for each 1,000 brake horsepower of the main engines or fraction thereof. However, not more than six such extinguishers need be carried.

(*b*) All vessels of more than 300 gross tons, regardless of the flash point of fuel used, and all vessels of 300 gross tons and under using fuel having a flash point of above 110° F., shall be provided with a 12-gallon foam-type or a 35-pound carbon-dioxide-type fire extinguisher for fighting fire in the machinery space.

(*c*) All vessels using fuel having a flash point of 110° F. and lower and all vessels of more than 300 gross tons regardless of the flash point of the fuel used, shall be fitted with an approved carbon-dioxide system in the machinery space.

(*d*) When a donkey boiler fitted to burn oil as fuel is located in a machinery space, there shall be substituted for the 12-gallon foam-type or 35-pound carbon-dioxide (CO_2) unit required in (*b*) above, one approved 40-gallon foam-type or one approved 100-pound carbon-dioxide (CO_2) type which shall be a permanently installed single unit which may by simple means and by a single operator be rapidly put into operation. They shall be equipped with suitable hose and nozzles on reels or other practicable means easily accessible and of sufficient length to reach any part of the spaces protected.

(*e*) In machinery spaces of vessels of over 300 gross tons, which contain electric propelling motors and generators of the open type at least one 15-pound carbon-dioxide (CO_2) extinguisher shall be provided for each such electric propelling motor and generating unit.

(*f*) Small compartments of vessels of over 300 gross tons containing auxiliary internal-combustion engines such as emergency generators shall, in addition to any other extinguishers required, be provided with one approved 15-pound carbon-dioxide (CO_2) or 2½-gallon foam-type extinguisher for each such compartment. This extinguisher shall be located outside of and adjacent to the entrance of the compartment.

(*g*) Fixed carbon-dioxide (CO_2) smothering systems shall be arranged to discharge into the lower part of the space protected. The control releasing the gas shall be located in a position outside the space(s) protected and readily accessible when under way. The apparatus furnishing the carbon-dioxide supply shall not be located in the compartment which

its discharge outlets protect unless there is no other desirable location available. The quantity of carbon dioxide provided shall be sufficient to flood all protected spaces simultaneously. The whole charge of gas shall be capable of being released simultaneously to all spaces protected by operating the control. All cylinders shall be completely discharged in not more than 2 minutes. The arrangement of the piping shall be such as to give a general and fairly uniform distribution over the entire area protected. When the space protected is part of or directly adjoins spaces where passengers are carried or may congregate, or quarters for crew, or spaces where crew may be stationed or employed, and where the arrangement is such that the discharge of the gas would constitute a hazard, an alarm shall be fitted to the system which will operate simultaneously with the operation of the release control. Screening nozzles shall be provided for all openings which would admit air in such quantities into the lower parts of the space protected as to impair materially the smothering effect.

(*h*) The quantity of gas required is to be based on the gross volume of the space protected. Where bilges are open or communicating to more than one space, such spaces, together with bilge, shall be considered as one space in determining the capacity of the sytem. The quantity of gas required for a fixed system on vessels using fuel having a flash point of 110° Fahrenheit and lower shall be as follows:

TABLE IV

Gross volume of space (cu. ft.):	*Carbon dioxide (in lbs.)*	Gross volume of space (cu. ft.):	*Carbon dioxide (in lbs.)*
Up to 100	7. 5	1,200–1,600	100
100–140	10	1,600–2,700	150
140–220	15	2,700–3,600	200
220–300	20	3,600–4,500	250
300–375	25	4,500–6,000	300
375–500	35	6,000–50,000	[1]
500–800	50	Above 50,000	[1]
800–1,200	75		

[1] 60 lbs. for each 1,000 cu. ft.

The quantity of gas required for a fixed system on vessels using fuel having a flash point above 110° F., shall be as determined by the following formula:

$$W = \frac{L \times B \times D}{22}$$

Where W = the weight of CO_2 required in pounds.
L = the length of machinery space in feet.
B = breadth of the machinery space in feet.
D = distance in feet from tank top or flat forming lower boundary to the underside of deck forming the hatch opening.

(*i*) Such system shall be in working condition and ready for instant use at all times while passengers are on board.

(*j*) Cylinders, piping, and controls shall be protected from damage and be securely fastened and supported.

(*k*) The local inspectors shall determine, at least annually, the quantity of gas available for use by weighing the cylinders. Where weight of CO_2 in any cylinder is more than 10 percent deficient, the cylinder shall be recharged or replaced.

27.3–4 Vessels carrying motor vehicles.—All motorboats or motor vessels which transport automobiles or motor vehicles shall carry, in addition to any other extinguishers required by these regulations approved carbon-dioxide, foam-type or carbon-tetrachloride fire extinguishers, in accordance with the following table:

TABLE IV–A

Automobiles or motor vehicles carried	Carbon-dioxide or foam-type fire extinguishers	Carbon-tetrachloride fire extinguisher
1 and not over 5	1	4
6 and not over 10	2	5
11 and not over 20	3	6
21 and not over 30	4	8
31 and not over 40	5	10
41 and not over 50	6	12

(*a*) For each additional 20 automobiles or motor vehicles, or fraction thereof, add one carbon-dioxide or one foam-type or two carbon-tetrachloride extinguishers.

(*b*) Table IV–A is based upon, in the case of carbon-dioxide or foam-type extinguishers, 15–pound carbon-dioxide units and 2½–gallon foam-type units. In the case of the carbon-tetrachloride type, each extinguisher is to have a capacity of 1 quart.

(*c*) These requirements may be reduced to 25 percent but not less than one of either when an efficient overhead water-sprinkling system, a carbon-dioxide or a foam-type system with sufficient hose to reach all parts of the deck where automobiles or motor vehicles are carried is installed, said systems to be installed in accordance with drawings or blueprints and specifications approved by the supervising inspector of the district having original jurisdiction. When a vessel is provided with enough fire extinguishers to take care of all the automobiles or motor vehicles that can be carried, no extra fire extinguishers shall be required for any number of motorcycles carried.

27.3–5 Location and condition.—Fire extinguishers shall be at all times kept in condition for immediate and effective use and shall be so placed as to be readily accessible.

27.3–6 Inspection.—At least annually all fire extinguishers shall be checked under the supervision of the local inspectors as follows:

(*a*) *Carbon-dioxide-type extinguishers.*—Weigh, and if found to be more than 10 percent under required weight, same must be recharged. Examine discharge pipes and nozzles on fixed systems.

(*b*) *Foam-type extinguishers.*—Discharge, thoroughly wash out, and recharge in accordance with the manufacturer's instructions.

(*c*) *Carbon-tetrachloride extinguishers.*—Examine and operate (fluid may be discharged into clean, dry glass or porcelain container and returned to extinguisher).

27.3-7 Existing equipment.—Approved types of portable fire extinguishers now on board vessels subject to these regulations and which are of the carbon-dioxide, foam, or carbon-tetrachloride type may be continued in use. All motorboats and motor vessels will be required to have on board the extinguishers and extinguishing equipment required by these regulations by April 25, 1941, except that motor vessels of over 300 gross tons will not be required to be fitted with fixed carbon-dioxide smothering systems until after April 24, 1943.

Carburetor Backfire Flame Arrestor

27.4-1 Where required.—The carburetor(s) of every engine installed on all motorboats and motor vessels after April 25, 1940, which use gasoline as fuel shall be fitted with an approved device which has demonstrated its ability to arrest backfire.

Ventilation

27.5-1 Where required.—All motorboats and motor vessels which are constructed or decked over after April 24, 1940, and which use gasoline or other liquid fuel having a flash-point of less than 110° F., shall be provided with ventilation as follows:

(*a*) At least two ventilators fitted with cowls or their equivalent for the purpose of properly and efficiently ventilating the bilges of every engine and fuel-tank compartment in order to remove any inflammable or explosive gases.

(*b*) Motorboats and motor vessels constructed so that the greater portion of the bilges under the engine and fuel tanks are open and exposed to the natural atmosphere at all times are not required to be fitted with ventilators.

Licensed Operators

27.6-1 Requirements.—The requirements for licensed operators on motorboats shall be as set forth in Part 25.

PART 28.—SPECIFICATIONS AND PROCEDURE FOR APPROVAL OF EQUIPMENT

GENERAL

Sec:
28.1–1 General provision.
28.1–2 Marking.
28.1–3 Plans.

NAVIGATION LIGHTS

28.2–1 Specifications.
28.2–2 Procedure for approval.

FIRE EXTINGUISHERS

28.3–1 General characteristics.
28.3–2 Specifications for portable foam-type.
28.3–3 Specifications for portable carbon-tetrachloride type.
28.3–4 Specifications for portable carbon-dioxide type.
28.3–5 Approval.
28.3–6 Marking of extinguishers.

LIFESAVING EQUIPMENT

Sec.
28.4–1 General provisions—Approval.
28.4–2 General characteristics of life preservers and ring buoys.
28.4–3 Buoyant materials.
28.4–4 Specifications for block-cork life preserver.
28.4–5 Specifications for balsa-wood life preserver.
28.4–6 Specifications for kapok life preserver.
28.4–7 Specifications for 20- and 24-inch cork or balsa-wood ring life buoys.
28.4–8 Specifications for kapok buoyant cushion.
28.4–9 Factory inspection.
28.4–10 Manufacturer's affidavit.

CARBURETOR BACKFIRE FLAME ARRESTOR

28.5–1 General provisions—Approval

GENERAL

28.1–1 General provision.—This part sets forth the specifications and procedure to be followed by manufacturers in order to obtain approval of equipment required by these regulations. Wherever a particular type of equipment or arrangement is specified, any other equipment or arrangement may be approved after suitable trials or tests have shown it to be as effective as the type or arrangement specified.

28.1–2 Marking.—All approved equipment shall be legibly marked with the name and address of the manufacturer.

28.1–3 Plans.—After approval, if required, 60 copies of all plans and all specifications of equipment shall be supplied for use by enforcement officers. When plans are furnished in such form that they may be duplicated, two copies only will be required.

Navigation Lights

28.2–1 Specifications—(*a*) *Type and size of lenses.*—The type and minimum sizes of lenses for navigation lights for motorboats of classes A, 1, 2, and 3 shall be as follows:

Table V

Class	Use	Outside radius of curvature of hulls eye in inches	Visible height in inches	Type
A	White light aft	No required size or type.		
A	Combination light	No required size or type.		
1	White light aft	No required size or type.		
1	Combination lights	1⅜	2⅜	Fresnel.
2	White light forward	1¾	3½	Fresnel.
2	White lights aft	1½	2½	Fresnel.[1]
2	Side lights	1⅞	3½	Fresnel.
3	White light forward	2⅛	4¼	Fresnel.
3	White light aft	1½	2½	Fresnel.[1]
3	Side lights	2¼	4¼	Fresnel.

[1] May be of the hall-type fresnel lens.

(*b*) *Design.*—The lens shall be so designed that rays emitted from a light source centrally located within the lens shall emerge practically parallel.

The lens for the port side light, starboard side light, and the combination light shall be of a color that, when viewed from the required distance of 1 mile on a clear dark night, shall appear as a distinctive red or green signal.

(*c*) *Construction.*—Navigation light cases shall be substantially constructed of either metal castings or sheet metal or a combination of both. The materials used shall be either non-corrosive or rendered corrosion-resistant.

The illuminant shall be so located in the case that the intensity of spill light, visible at any angle outside the arc of visibility required for the light, shall be a minimum.

The illuminant shall be rigidly mounted in the case to insure that the height of the illuminant shall always correspond to the vertical center of the bulls eye.

Navigation lights using oil shall have the cases so constructed that the flame of the illuminant shall not be affected by adverse weather conditions.

The combination light for classes A and 1 shall have a center partition projecting forward of the lenses, this partition being of such height and length to prevent the signal (red or green) from being seen across the bow.

28.2–2 Procedure for approval.—Plans and specifications in quadruplicate of each type of light for which approval is desired shall be submitted for examination. Upon request one sample of each type of light, complete in all details, for which approval is desired, shall be submitted.

Changes made by a manufacturer in the construction or material of any approved light shall be promptly reported to the Director, and a sample of the light or lights incorporating the changes shall be forwarded to said officer.

If, during the consideration of any lights submitted for approval, it becomes necessary to formulate and conduct tests, such tests will be conducted using the manufacturer's material. All charges shall be borne by the manufacturer.

Fire Extinguishers

28.3–1 General characteristics.—All fire extinguishers shall be of efficient design, well constructed of suitable materials, and suitable in character and effectiveness for the purposes intended.

28.3–2 Specifications for portable foam type—(*a*) *Materials and workmanship.*—The material shall be of the best quality and the construction and finish shall be of first-class character throughout.

(*b*) *Design and construction.*—The 1¼-gallon and 2½-gallon size extinguishers shall be of cylindrical form with a total capacity of 1½ gallons for the 1¼-gallon size and 3 gallons for the 2½-gallon size, provided with a cylindrical inner container, employing as an extinguishing agent an effective extinguishing foam discharged through a hose and nozzle, without stopcock or valves of any kind and operated by simply inverting the extinguisher.

The extinguisher shall be so designed and constructed that it will withstand an internal hydrostatic pressure of 350 pounds per square inch (held for 1 minute) without leakage or permanent distortion; and an internal hydrostatic pressure of 385 pounds per square inch (held for 1 minute) without permanent distortion in excess of the following: An increase in girth of $\frac{1}{32}$ of an inch; an increase in height of $\frac{1}{32}$ of an inch; a drop in the bottom, at the center, of $\frac{1}{16}$ of an inch. Ultimate failure shall not occur at a pressure of less than 455 pounds per square inch and if below 500 pounds per square inch shall not occur in any joint, seam, casting, or fitting. Every shell shall be tested at 350 pounds per square inch at the factory.

Each extinguisher shall be equipped with a safety release device of the frangible disc type to protect the extinguisher shell against excessive pressure. The safety release device shall be so designed and constructed that it will not release at a pressure of 100 pounds per square inch or less and will not be weakened by repeated applications of a pressure of 100 pounds per square inch. It must not fail to prevent the pressure within the extinguisher from rising above 200 pounds per square inch. The safety release device shall be so conconstructed as to form a complete assembly which cannot be taken apart without destroying the device so that, when it has functioned, it must be replaced with a new complete assembly. No safety release device shall be permitted in which moving parts are necessary to enable it to function.

The inner container shall be of cylindrical form and of rugged construction, and it shall be provided with a suitable, loosely fitting stopple. It must be readily removable from the extinguisher. All joints on the inner container shall be securely fastened.

Both the inner and outer solution containers shall have suitable filling indicators.

The outlet elbow shall be attached to the extinguisher as near the top as possible and shall be protected with a suitable screen.

The hose shall be made of rubber reinforced with at least three layers of canvas and shall be capable of withstanding a hydrostatic pressure of 400 pounds per square inch maintained for a period of 5 minutes. The attachments of the hose to the coupling and nozzle shall be such as to withstand a hydrostatic pressure of 350 pounds per square inch, held for 1 minute, without leaking or coming free at the coupling or nozzle.

The 12-gallon and 40-gallon size extinguisher shall be a permanently installed single unit, securely attached in place of a type which may, by simple means and by a single operator, be rapidly put into operation. The extinguisher shall be of a cylindrical form, provided with a cylindrical inner container employing as an extinguishing agent an effective fire-extinguishing foam. The capacity of the extinguisher shall be considered as that of the total volume of the chemical solution, and in the case of the 40-gallon size may be less than 40 gallons, but not less than 36 gallons.

The extinguisher shall be equipped with a hose and nozzle on a reel or a suitable rack so that it shall be easy of access and can be quickly brought into operation by a single operator. Sufficient length of hose to reach all parts of the space protected shall be provided, but the extinguisher shall be tested with not less than 50 feet of hose. A shut-off valve may be supplied, but it shall be so arranged that it will not shut off the discharge completely but will provide sufficient venting area, when in the closed position, to prevent the pressure within the extinguisher from rising sufficiently to cause the safety release device to function when the extinguisher is operated not only at 70° F. but at temperatures as high as 120° F.

Every extinguisher shall be subject to a hydrostatic test pressure of 400 pounds per square inch (held for 1 minute) at the factory, and shall be so designed that extinguisher shall not burst at a pressure less than 1,000 pounds per square inch.

The extinguisher shall be equipped with a suitable safety-release device (such as the frangible disc type), properly placed, and of adequate capacity, and shall assure that the pressure within the extinguisher when discharged at a temperature of 120° F. will not rise above the pressure at which the extinguisher is tested if the outlet is plugged and shall not discharge at any pressure which may be developed in the normal operation of the extinguisher.

The inner container shall be of cylindrical form and of rugged construction. It must be readily removable from the extinguisher. All joints in the inner container shall be securely fastened.

The hose shall be made of rubber reinforced with at least three layers of canvas and shall be capable of withstanding a hydrostatic pressure of 400 pounds per square inch, maintained for a period of 5 minutes.

All surfaces of extinguishers which come in contact with the solutions shall be evenly and completely coated with a suitable corrosion-resisting material.

(*c*) *Performance.*—The 1¼-gallon and 2½-gallon extinguishers shall be so designed and constructed that with the solutions at 70° F. it will discharge the stream of foam a horizontal distance of not less than 20 feet within 10 seconds, maintain a range in excess of 20 feet for not less than 25 seconds for the 1¼-gallon size and 50 seconds for the 2½-gallon size from the time the extinguisher is inverted. The maximum pressure shall not be developed within 5 seconds after inversion of the extinguisher and shall not exceed 75 pounds per square inch on free discharge when the extinguisher is operated at a temperature of 70° F. The maximum pressure developed with the extinguisher at a temperature of 120° F. and with the outlet plugged shall not exceed 350 pounds per square inch. The extinguisher, when discharged at a temperature of 70° F., shall be capable of discharging 9 gallons of foam for the 1¼-gallon size and not less than 18 gallons of foam for the 2½-gallon size.

The 12-gallon and 40-gallon size extinguisher when operated at any temperatures between 70° and 120° F. shall be capable of discharging effective fire extinguishing foam of a total quantity of not less than 85 gallons for the 12-gallon size and 250 gallons for the 40-gallon size. The time of effective discharge shall be approximately three or four minutes and the range of the stream shall not be in excess of 40 feet from the nozzle with the major portion of the foam falling between 20 and 40 feet. The maximum pressure developed within the extinguisher with the outlet closed and the solutions at 120° F. shall not exceed 500 pounds per square inch.

(*d*) *Chemical charge.*—For the outer container the chemical charge shall be a water solution of bicarbonate of soda and a foam-forming ingredient, and for the inner container, a water solution of aluminum sulfate. The chemical employed shall be of such quality and in such proportions as will assure compliance with the requirements in regard to pressures and performance.

The chemical charge shall be of such quality and character that it can be stored in the containers in which it is supplied for at least 1 year without deterioration, and its water solutions shall be capable of remaining in the charged extinguisher at least 1 year without deterioration or becoming foul. It shall be capable of producing a durable foam consisting of a mass of minute bubbles filled with a noncombustible gas which are not easily broken down by intense heat and which will adhere well to vertical or horizontal surfaces and not be harmful to persons or materials not harmed by water.

The containers in which the chemical charge is supplied shall be of substantial construction, preferably entirely of metal, and shall be impervious to moisture or air. Each container shall have a securely attached label bearing complete and detailed directions for the

preparation of the charge which it contains. In addition, each label shall include the following:

(1) Some descriptive designation, as, for example, a trade name which is definitely identified with the charge of the particular make and composition which is to be used with the extinguisher.

(2) A statement of the particular extinguisher with which the charge is to be used.

(3) The name and address of the manufacturer of the extinguisher with which the charge is to be used, or his exclusive and generally recognized trade-mark or trade device.

(*e*) *Labeling and marking.*—Each extinguisher shall have permanently and securely attached to the extinguisher shell a metal plate carrying the following:

(1) Operating directions in letters not less than ½-inch in height, of a color different from the background.

(2) Directions for recharging.

(3) A statement of the particular make or brand of chemical charges to be used with the extinguisher.

(4) A statement that if not used for fire, the extinguisher shall be discharged and recharged at least once a year.

(5) That whenever the extinguisher is discharged, it shall be thoroughly cleaned, including the hose, before refilling.

(6) That it shall be protected from freezing.

(7) That the extinguisher has been tested at the test pressure required.

(8) Each extinguisher shall also bear, either on the metal plate attached to the side of the shell or on a separate metal plate attached to the extinguisher cap, full directions for the care and replacement of the safety release device.

28.3–3 Specifications for portable carbon-tetrachloride type.—(*a*) *Materials and workmanship.*—The container and all parts of the operating mechanism shall be of brass, lead, or other material of equal corrosion-resisting properties. No material subject to deterioration by the liquid shall be used in contact with the liquid or its vapor. The workmanship and finish shall be of first-class character throughout.

(*b*) *Type.*—Extinguishers shall be of the self-contained, hand-operated type, which expel the extinguishing liquid by the operation of a pump forming an integral part of the extinguisher itself. No form of device whose operation is dependent on stored energy will be acceptable.

(*c*) *Construction.*—The extinguisher shall be of sufficiently rugged construction to withstand the vibrations to which it will be subjected, and shall be capable of being effectively operated at any angle or in any position in which it would be held in actual service, after having been dropped from a horizontal holding position through a distance of 4 feet upon a 2-inch pipe lying at right angles to the axis of the extinguisher on a concrete floor. The design and construction of the parts by which the machine is placed in operation must be as simple as possible and of a character such that their method of use is readily apparent.

The design and construction shall be such that at least one quart of extinguishing liquid can be discharged when the extinguisher is operated in any position in which it would be held in actual service.

(*d*) *Performance.*—The extinguisher shall be capable of being easily and effectively operated by a person of ordinary strength; it shall be capable of being effectively operated at any inclination or in any position in which it is likely to be held in service; when held and operated in the normal operating position, the range shall be such that the liquid is projected a horizontal distance of at least 20 feet from the nozzle, in a practically continuous and compact stream, not appreciably broken by the discharge of air. When continuously operated by a person of ordinary strength, it shall be capable of delivering the liquid at the rate of one quart in from 40 to 50 seconds. It shall effectively prevent the loss of extinguishing liquid from the extinguisher by leakage or otherwise.

(*e*) *Extinguishing liquid.*—The extinguishing liquid shall be capable of extinguishing fires caused by the burning of inflammable liquids and solids, shall be a non-conductor of electricity, and shall consist of carbon tetrachloride containing other suitable products necessary to produce a liquid conforming to the following requirements:

(1) *Appearance.*—The material shall be a clear, homogeneous, mobile liquid.

(2) *Specific gravity.*—The specific gravity at 15.5/15.50 C. shall be not less than 1.50.

(3) *Cold test.*—The liquid shall have a cold test not higher than minus 45.50 C. (minus 50° F.).

(4) *Distillation.*—Not over 2 percent shall distill below 60° C. At least 90 percent shall distill between 70° and 80° C. At least 99 percent shall distill below 100° C.

(5) *Impurities.*—The liquid shall be free from nitrobenzene, water, acid, or alkali, and free halogen, and shall not contain more than 1 percent, by weight, of carbon disulfide. It shall not corrode brass, lead, or other material of equal corrosion-resisting properties.

(*f*) *Labeling and marking.*—Each extinguisher shall have permanently and securely attached to the extinguisher shell a metal plate carrying the following:

(1) Clear and concise operating instructions, conspicuously arranged, in letters not less than one-eighth inch in height, of a color different from that of the background and of the other instructions on the plate. The operating instructions should be the most conspicuous part of the plate.

(2) Complete directions for refilling and cautions against the use of liquids other than those specified, and against permitting the extinguisher to remain partially or completely empty.

28.3-4 Specifications for portable carbon-dioxide type.—(a) *Materials and workmanship.*—The workmanship and finish shall be of first-class character throughout.

(b) *Design.*—The design and operation shall be simple and reliable. The carbon dioxide gas shall be contained in cylinders which have been constructed, tested, and marked in accordance with Interstate Commerce Commission specifications applying to containers for this gas and in effect at the time the cylinder is made. The capacity of the cylinders shall

be such that when charged with carbon dioxide, the weight of carbon dioxide will not exceed 68 percent of the water capacity by weight of the cylinder.

A manually operated release valve shall be supplied which shall provide a time of discharge suitable to the size. A suitable outlet shall be provided for directing the carbon dioxide gas or snow. A safety release device of efficient design and operation shall be provided to release the gas between the range of pressure of 2,500 and 3,000 pounds per square inch.

The 35-pound and 100-pound extinguishers shall be of a type which may, by simple means and by a single operator, be rapidly put into operation. They shall be fitted with a suitable nozzle and hose, mounted on reel a or rack, of sufficient length to reach any part of the space to be protected. The construction shall be rugged and suitable for marine use. The manually operated release valve shall be ruggedly built for repeated operation and shall not be subject to corrosion or shall not cause freezing of the gas discharge.

(*c*) *Testing.*—The charged cylinder used in the original equipment with the necessary fittings shall be tested by means of a water seal for leakage for 24 hours, or by other suitable means, and all leaking cylinders shall be rejected.

(*d*) *Extinguishing gas.*—The carbon-dioxide extinguishing gas shall be commercially pure carbonic-acid gas or pure carbon dioxide, free from moisture and from free oxygen and from other impurities in material quantities.

(*e*) *Labeling and marking.*—Each extinguisher shall have permanently and securely attached to the extinguisher's shell a metal plate carrying the following:

(1) Clear and concise operating instructions, conspicuously arranged. The operating instructions shall be the most conspicuous part of the plate.

(2) Complete directions for maintaining the extinguisher in effective condition. The tare weight of the cylinder shall be stamped into the valve and shall include the empty cylinder itself, the valve, and the syphon reaching to the bottom of the cylinder.

(3) A statement that the extinguisher shall be recharged only at charging stations appearing on the card attached to the extinguisher.

In addition to the metal plate, each extinguisher shall be provided with a card, contained in a durable waterproof envelope attached to the extinguisher by a corrosion-resisting wire or metal chain, on which are listed the names and addresses of the manufacturer's recharging stations where there are facilities for properly recharging the extinguisher.

28.3–5 Approval.—The manufacturer shall submit an application to the Director for each type of fire extinguisher for which approval is desired, together with plans and specifications in quadruplicate. Upon request such number of samples as are required for proper testing of each type shall be submitted. The cost of conducting tests incident to approval shall be borne by the manufacturer.

28.3–6 Marking.—Every fire extinguisher approved shall have permanently and securely attached, a metallic name plate having plainly stamped thereon the name of the fire extinguisher; the rated capacity in gallons, quarts, or pounds; the name and address of

the person or firm for whom approved; the directions for use; and the identifying mark of the actual manufacturer. Other details for marking are also included in the specifications of the various types.

Lifesaving Equipment

28.4–1 General provisions—Approval.—The standard specifications for block-cork life preservers, balsa-wood block life preservers, and kapok life preservers, cork and balsa-wood ring buoys, and kapok buoyant cushions are set forth in this part in order to enable manufacturers to produce equipment which fully meets the approval requirements by strict adherence to all details of the standard specifications. Manufacturers who desire to manufacture such standard life preservers, ring buoys, or buoyant cushions are not required to submit samples of such equipment to the Board for approval, but may commence such manufacture after submitting an affidavit in form as provided in § 28.4–10 and receiving confirmation that their name has been placed on the Board's list of equipment manufacturers under affidavit and the assignment of an official approval number for each type of equipment.

Manufacturers who desire to manufacture life preservers, ring buoys, or buoyant cushions of a character and type in any degree different from the standards contained in this part, which equipment is to be sold for use on motorboats and motor vessels subject to these regulations, shall submit samples in duplicate to the Bureau in order that they may be placed before the Board of Supervising Inspectors for their consideration and approval. Each type of equipment so submitted to the Board and approved by them will receive a separate approval number.

28.4–2 General characteristics of life preservers and ring buoys.—Every life preserver or ring buoy shall conform to the following general requirements:

(*a*) Construction, materials, and workmanship shall be at least equivalent to that of a standard type.

(*b*) The buoyancy shall not be dependent upon air compartments or loose granulated material.

(*c*) Life preservers shall be simple in design, reversible, and capable of being quickly adjusted, supporting the wearer in the water in an upright or slightly backward position.

28.4–3 Buoyant materials.—The buoyant materials in general use are block cork, balsa wood, and kapok, which, when used in the construction of life preservers and ring buoys, shall conform to the following requirements:

(*a*) *Block cork.*—The cork shall be of good quality cleaned cork, free from any imperfections affecting its durability, and shall be untreated and weigh not more than 12 pounds per cubic foot. It shall be free from cracks or bark checks greater than one-half the thickness by ⅜ inch wide. Where blocks are made of separate pieces, such pieces shall be fastened together with non-corrosive, buoyant materials.

(*b*) *Balsa wood.*—Balsa wood shall be of the genus Ochroma thoroughly kiln dried and heat treated to a moisture content not to exceed 5 percent and shall weigh not more than

8 pounds per cubic foot. It shall be sound, free from rot, dote, knots, pith checks, and other defects.

(*c*) *Kapok.*—It shall be prime Japara kapok of the best quality, well teased and free from seeds or other foreign matter. Kapok shall be tested for buoyancy in the ratio of 16½ pounds for each 20 ounces of kapok or fraction thereof.

28.4–4 Specifications for block-cork life preserver—(*a*) *Type.*—The type shall conform to Figure 1 and shall be reversible and vestlike, with recesses under arms to allow front and back sections to fit around the upper part of the wearer and held in place by straps, the whole to be of such construction and character as to support the wearer in an upward or slightly backward position. Children's life preservers are to be of the same general form of

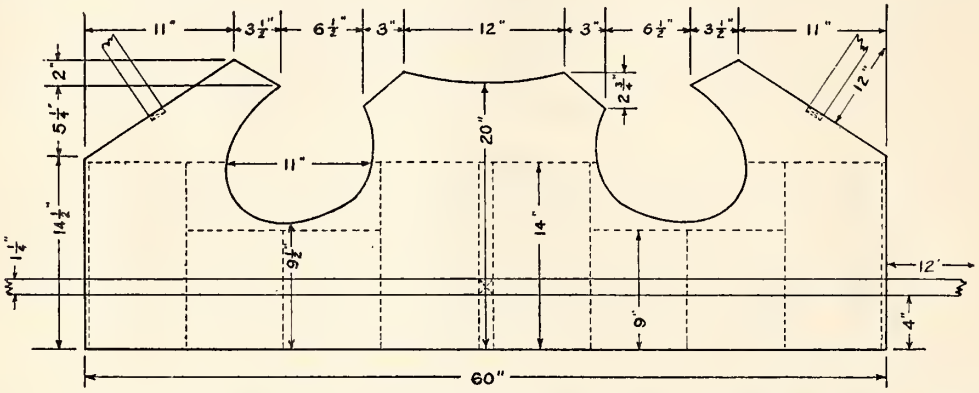

FIGURE 1.—Approximate dimensions of a standard cork and balsa wood life preserver cutting pattern. Dotted lines indicate stitching.

construction and conform in every respect, as regards material and design, to the standard approved adult life preserver with the exception that the size is to be reduced one-third.

(*b*) *Buoyant material.*—It shall contain eight blocks of cork of the following approximate dimensions: 4 blocks 11 x 5 x 1⅞ and 4 blocks 6 x 5 x 1⅞. The corners and edges of the blocks shall be slightly rounded or beveled. The weight of the finished cork in each life preserver shall be not less than 4 pounds and not more than 4.5 pounds.

(*c*) *Buoyancy test.*—The life preserver shall be submerged in a tank of fresh water for a period of 48 hours. The life preserver shall then support in fresh water a net weight of 16½ pounds or 11 pounds for children's type.

(*d*) *Cover.*—The cover shall be of unbleached, uncolored drill or twill, without filling or sizing, weighing not less than 7.2 ounces to the square yard. It shall be not in more than two pieces, one piece for either side.

(*e*) *Marking.*—Each life preserver shall be plainly marked on the front compartment with either the word "Adults" or the word "Children" as the case may be. It shall also be plainly stenciled with the name and address of the manufacturer.

(*f*) *Smooth surface.*—The outside surface, edges, and corners of the buoyant material shall be of such smoothness as will prevent undue destruction of the covering material and present a suitable smooth surface for legible stenciling and stamping by inspectors.

(*g*) *Stitching.*—All seams and other machine sewing shall be made with a short lock stitch, with not less than eight stitches to the inch. The lower longitudinal edge of the covering seam shall be turned to a roll and closely rope stitched.

(*h*) *Straps.*—The straps shall have a tensile strength of at least 175 pounds and shall be of double-woven cotton tape 1¼ inches in width having selvedge or cord edges. One strap on each side secured by double stitching and extending 12 inches beyond the end of the life preserver, and two neck straps 12 inches in length. All straps are to be sewn to the body of the life preserver by double stitching.

(*i*) *Thread.*—The thread shall be of a size and strength not less than Barbour's linen, three-cord, No. 25 machine thread. Any thread other than of linen shall require the approval of the Board.

28.4–5 Specifications for balsa-wood life preserver—(*a*) *Type.*—This shall be the same as for cork as provided in section 28.4–4 (*a*).

(*b*) *Buoyant material.*—It shall contain eight blocks of balsa wood of the following approximate dimensions: four blocks 11 x 5 x 1⅞ and four blocks 6 x 5 x 1⅞. The corners or edges of the blocks shall be slightly rounded or beveled. The weight of the finished balsa wood used in each life preserver shall not be less than 2⅔ pounds nor more than 3 pounds.

(*c*) *Buoyancy test.*—This shall be the same as provided in section 28.4–4 (*c*).

(*d*) *Cover.*—This shall be the same as provided in section 28.4–4 (*d*).

(*e*) *Marking.*—This shall be the same as provided in section 28.4–4 (e).

(*f*) *Smooth surface.*—This shall be the same as provided in section 28.4–4 (*f*).

(*g*) *Stitching.*—This shall be the same as provided in section 28.4–4 (*g*).

(*h*) *Straps.*—This shall be the same as provided in section 28.4–4 (*h*).

(*i*) *Thread.*—This shall be the same as provided in section 28.4–4 (*i*).

28.4–6 Specifications for kapok life preserver—(*a*) *Type.*—This type shall be the same as provided in section 28.4–4 (*a*) except that it shall conform to figure 2.

(*b*) *Buoyant materials.*—The life preserver shall be filled with not less than 20 ounces of kapok of the kind provided in section 28.4–3 (*c*).

(*c*) *Buoyancy test.*—The life preserver shall be submerged in a tank of fresh water for a period of 48 hours. The life preserver shall then support in fresh water a net weight of 16½ pounds or 11 pounds for children's type.

(*d*) *Cover.*—This shall be the same as provided in section 28.4–4 (*d*).
(*e*) *Marking.*—This shall be the same as provided in section 28.4–4 (*e*).
(*f*) *Stitching.*—This shall be the same as provided in section 28.4–4 (*g*).
(*g*) *Straps.*—This shall be the same as provided in section 28.4–4 (*h*).
(*h*) *Thread.*—This shall be the same as provided in section 28.4–4 (*i*).

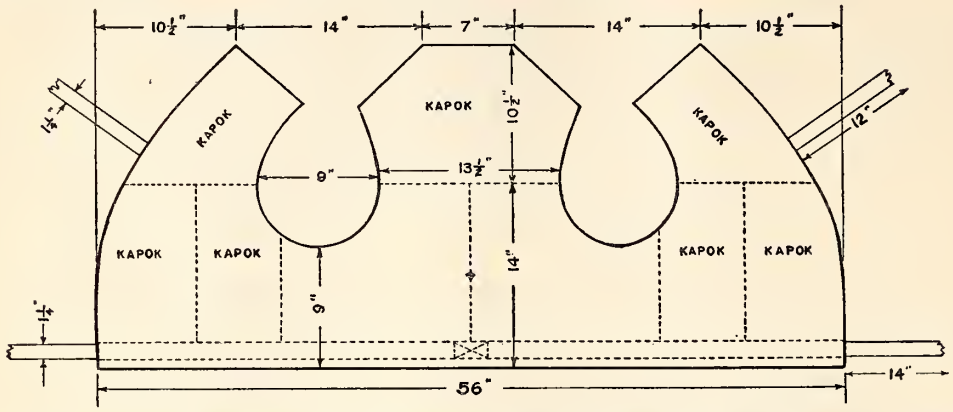

FIGURE 2.—Approximate dimensions of a standard kapok life preserver cutting pattern. Dotted lines indicate stitching of pockets and drawstring tunnel.

28.4–7 Specifications for 20- and 24-inch cork or balsa-wood ring life buoys—(*a*) *Type.*—Such ring buoys shall conform to the dimensions and details shown in figure 3 and figure 4 respectively.

(*b*) *Buoyant materials.*—These shall meet the applicable requirements as provided in section 28.4–3 for block cork and balsa wood.

(*c*) *Smooth surface.*—The outside surface and edges of the buoyant material shall be of such smoothness as will prevent undue destruction of the covering material, and to present a suitable smooth surface for legible stenciling and stamping by the inspectors.

(*d*) *Glue.*—The glue used shall be insoluble in water, and the finished life buoy shall stand steaming at a pressure of 2 pounds for a period of 30 minutes without disintegrating or showing other positive indications of the glue losing its adhesive properties.

(*e*) *Buoyancy test.*—The ring buoy shall be submerged in a tank of fresh water for a period of 48 hours. The ring buoy shall then support in fresh water a net weight of 16½ pounds.

(*f*) *Cover.*—The cover shall be of unbleached, uncolored drill or twill, without filling or sizing, weighing not less than 7.2 ounces to the square yard.

(*g*) *Marking.*—Each ring buoy shall be plainly stenciled with the name and address of the manufacturer.

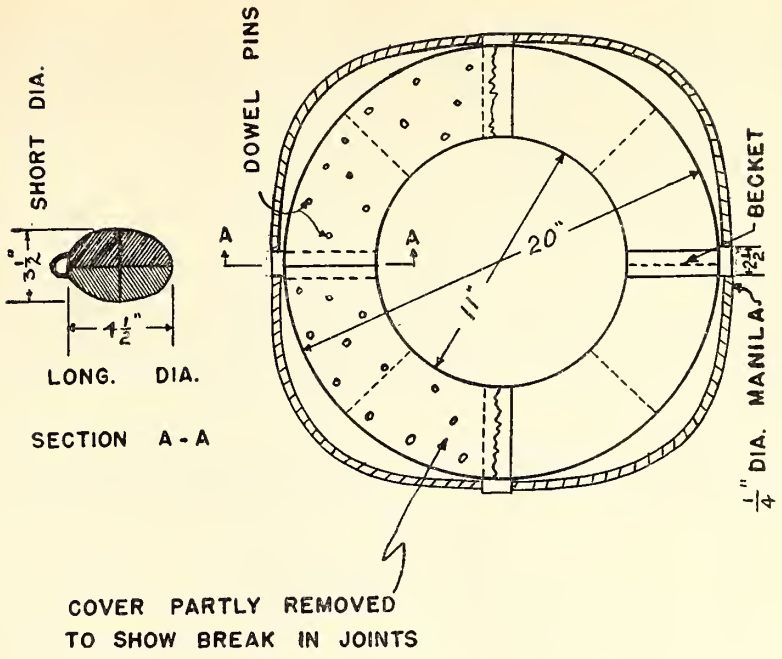

FIGURE 3.—Standard 20-inch ring life buoy.

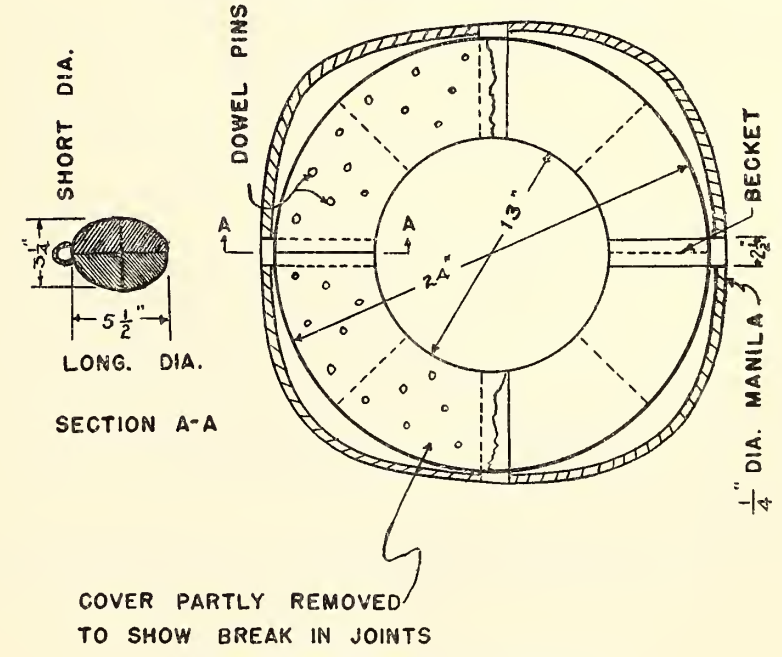

FIGURE 4.—Standard 24-inch ring life buoy.

(*h*) *Stitching.*—The cover shall be constructed and placed on the body of the life buoy in a substantial manner. All seams and other machine sewing on the life buoy shall be made with a short lock stitch not less than eight stitches to the inch. The inside seams shall be sewed with a rope stitch not less than three stitches to the inch. All thread used in the construction of the life buoy shall be of a size and strength not less than Barbour's linen, three-cord, No. 25 machine thread.

(*i*) *Beckets.*—Four beckets about 2 inches wide, made from the same material as the covering of the buoy, shall be securely attached to the life buoy and spaced at equal distance from each other.

(*j*) *Grab line.*—A grab line shall pass through the beckets which shall be sewed tightly together to prevent slipping. The line shall be manila ¼ inch in diameter, three-ply, medium quality having the ends securely and neatly spliced, the line to be festooned in bights around the outer edge of the life buoy.

28.4–8 Specifications for kapok buoyant cushion—(*a*) *Type.*—Shall conform to figure 5 and shall be a square box-type cushion having finished dimensions approximately 15 inches square with a 2-inch box having two grab straps on opposite edges.

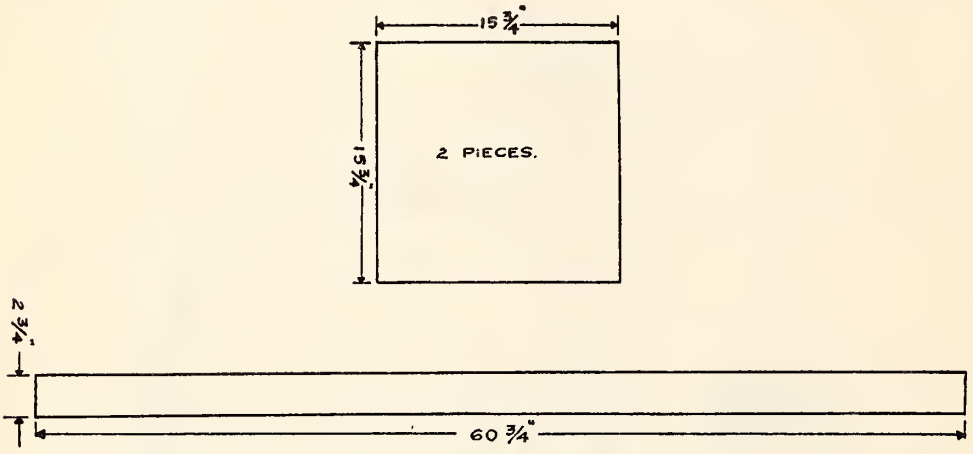

FIGURE 5.—Approximate dimensions of a standard kapok buoyant cushion cutting pattern.

(*b*) *Buoyant material.*—Each cushion shall contain not less than 20 ounces of kapok of the kind provided in section 28.4–3 (*c*).

(*c*) *Buoyancy test.*—The buoyant cushion shall be submerged in a tank of fresh water for a period of 48 hours. The buoyant cushion shall then support in fresh water a net weight of 20 pounds.

(*d*) *Cover.*—The buoyant material shall be completely protected by a cover of first-grade duck or drill having a weight of not less than 7.2 ounces per square yard or a leatherette

cover consisting of 59-inch, 1.85 drill, thread count 68 by 40; the coating to be at least the weight of 14 ounces for a finished width of 54 inches. The cover shall be designed and constructed with as few seams as practicable.

(*e*) *Straps.*—Two grab straps 1 inch in width made of either type of the above cover materials in double thickness securely sewn to the cover by double stitching. Straps shall be of the becket type and of such length that both straps are tight when grasped in one hand.

(*f*) *Stitching and thread.*—The method of stitching and thread employed shall be at least equivalent to the requirements for life preservers as set forth in these regulations.

(*g*) *Marking.*—Each cushion shall be marked "Approved buoyant cushion for use on motorboats of classes A, 1, or 2 not carrying passengers for hire, Act of Congress, April 25, 1940, United States Department of Commerce Approval No. ——, name and address of manufacturer."

28.4–9 Factory inspection—(*a*) *Life preservers, ring buoys.*—The supervising inspector of the district shall detail a local or assistant inspector to any place where approved life preservers or ring buoys are manufactured, whose duty it shall be to test and examine all such equipment manufactured at that place and satisfy himself that such life preservers and ring buoys are in accordance with the requirements of these regulations. When found to be in accordance with the requirements, the inspector shall stamp them with a stamp bearing the initials of his name and the date of examination and certifying that they have been examined and passed.

(*b*) *Buoyant cushions.*—When deemed necessary by the supervising inspector of the district, an inspector will be detailed to visit any place of manufacture of buoyant cushions to conduct such examinations and tests as he may find necessary.

28.4–10 Manufacturer's affidavit.—

AFFIDAVIT OF MANUFACTURER OF LIFESAVING EQUIPMENT FOR USE ON VESSELS SUBJECT TO THE ACT OF APRIL 25, 1940 (54 STAT. 163–167; 46 U. S. C., 526–526t), AND REGULATIONS THEREUNDER

State of _____, County of _____ On this _____ day of _____, 19____, I, the undersigned, _____ (Name), hereby certify that I am the _____ (Title) of the _____ (Name of company) located at _____, that I am authorized to make this affidavit; and that the _____ (Equipment) [1] of our manufacture to be furnished directly or through agents or dealers for use on vessels subject to the Act of April 25, 1940, will comply with the applicable provisions of the regulations prescribed by the Board of Supervising Inspectors and approved by the Secretary of Commerce.

(Signature) _____

Subscribed and _____ (Sworn or Affirmed) to before me this _____ day of _____, 19____

[SEAL] (Signature) _____

Notary Public.

[1] Indicate name and description of equipment.

Carburetor Backfire Flame Arrestor

28.5–1 General provisions—Approval.—Flame arrestors, backfire traps and other similar devices are to meet the following general requirements to secure approval:

(*a*) Devices which are approved and listed by the Underwriters Laboratories, Inc., will be approved without further test whenever the manufacturer submits an affidavit to that effect to the Board of Supervising Inspectors.

(*b*) Devices which, at the time of promulgation of these regulations are approved by the Navy Department, will be approved without further test whenever the manufacturer submits an affidavit to that effect to the Board of Supervising Inspectors.

(*c*) The Board will receive proposals for approval of other types and will formulate such tests as may be necessary, which tests will be conducted with the manufacturer's material and at his expense.

Part 29.—ENFORCEMENT [1]

Sec.
29.1 Reporting of violations.
29.2 Definition of motorboat.
29.3 Running lights.
29.4 Running lights not in conflict with anchor lights.
29.5 Lights, when not required.
29.6 Whistles and bells; when not required on outboard motorboats.
29.7 Documents and name.

29.1 Reporting of violations.—(*a*) All violations of the act of April 25, 1940 (Public 484, 76th Cong.), or of any regulation issued thereunder by the Board of Supervising Inspectors with the approval of the Secretary of Commerce, detected by enforcement officers other than collectors of customs must be reported directly to the Department of Commerce (Bureau of Marine Inspection and Navigation) regardless of mitigating circumstances. Such reports must be forwarded to the Bureau of Marine Inspection and Navigation in triplicate. The use of report forms heretofore used in making such reports to collectors of customs is authorized.

(*b*) All violations of the act of April 25, 1940 (Public 484, 76th Cong.), or of any regulation issued thereunder by the Board of Supervising Inspectors with the approval of the Secretary of Commerce, detected on motorboats or other vessels subject to inspection under the provisions of Title 52 of the Revised Statutes, or acts amendatory or supplementary thereto, by any enforcement officer, must also be reported directly to the board of local inspectors of the district where the motorboat or vessel is found. This report should be made in the most expeditious manner possible.

29.2 Definition of motorboat.—(*a*) The act of April 25, 1940 (Public 484, 76th Cong.) defines the word "motorboat" as including every vessel propelled by machinery and not more than 65 feet in length, except tugboats and towboats propelled by steam. The term, therefore, includes boats temporarily or permanently equipped with detachable motors and such vessels, when so equipped, are subject to that act.

29.3 Running lights.—The lights provided for in section 3 of the act of April 25, 1940 (Public 484, 76th Cong.) are running lights for motorboats subject to the provisions of that act in lieu of the lights prescribed, respectively, by article 2 of the act approved June 7, 1897 (30 Stat. 96, 33 U.S.C. 172), (covering certain harbors, rivers, and inland waters of the United States); rule 3 of the act approved February 8, 1895, as amended (28 Stat. 645 as amended, 33 U.S.C. 252), (covering the Great Lakes and their connecting and tributary waters); and rules 3, 5, 6, and 7 of section 4233 of the Revised Statutes, as amended (33 U.S.C. 312, 314–316), (covering western rivers). These running lights are required to be carried on all motorboats when under way on navigable waters of the United States not on the high seas in all weathers from sunset to sunrise. Motorboats when on the high seas must exhibit the lights prescribed by the international rules of 1890.

[1] The regulations in this section were promulgated by the Secretary of Commerce and were not prescribed by the Board of Supervising Inspectors.

29.4 Running lights not in conflict with anchor lights, etc.—The provisions of section 3 of the act of April 25, 1940 (Public 484, 76th Cong.) requiring running lights on motorboats are not in conflict with the provisions of the acts above cited requiring anchor lights, and lights in addition to the running lights on pilot, towing, and fishing vessels.

It will be observed that the penalties for violations of existing laws not in conflict with the act of April 25, 1940 (Public 484, 76th Cong.) remain unchanged.

29.5 Lights, when not required.—No penalty is incurred by motorboats for a failure to carry lights between the hours of sunrise and sunset.

29.6 Whistles and bells; when not required on outboard motorboats.—The provisions of sections 4 and 5 of the act of April 25, 1940 (Public 484, 76th Cong.) requiring whistles and bells on motorboats do not apply to motorboats propelled by outboard motors while competing in any race previously arranged and announced, nor do they apply to such boats if they are designed and intended solely for racing, while they are engaged in such navigation as is incidental to the tuning up of the boats and engines for the race.

29.7 Documents and name.—All motorboats of 16 gross tons or over used exclusively for pleasure should be documented as yachts; all motorboats of 5 net tons or over engaged in trade must be documented—i. e., licensed by the collectors of customs. Vessels under 5 net tons are not registered, enrolled, or licensed in any case. The license of the vessel (designated a document) obtained from the collector of customs is additional to and must not be confounded with the license required for the operator of a motorboat. All vessels, registered, enrolled, or licensed, except yachts, must have name and home port on stern and name on each bow. Documented yachts must have name and home port conspicuously placed on the hull. Tonnage measurement is necessary only in case of vessels required to be registered, enrolled, or licensed.

RECOMMENDED PRACTICES FOR THE CARE AND SAFE OPERATION OF MOTORCRAFT

General:
- (a) Purpose.
- (b) Petroleum vapor.
- (c) Proper materials for building and equipping vessel.
- (d) Condition of bilges.
- (e) Stability.
- (f) Electrical installation.
- (g) Knowledge of rudiments of navigation recommended.
- (h) Proper charts, compasses, etc., necessary.
- (i) Danger of overpowering vessel.
- (j) First-aid kit.
- (k) Anchors and cables.
- (l) Mooring.
- (m) Care of lifesaving equipment.
- (n) Sea connections.
- (o) Hand-operated bilge pump.

I. Hulls:
- I–a. Examination of hull.
- I–b. Cleaning of bilges.
- I–c. Examination of all underwater fittings.

II. Machinery:
- II–a. Machinery should be suitable for marine purposes.
- II–b. Drip pans.
- II–c. Exhaust pipe, proper arrangement of.
- 11–c–1. Exhaust manifold: Precautions to be taken in arrangement of.
- II–c–2. Discharge of engine cooling water.
- II–c–3. Protection of woodwork adjacent to exhaust pipe.
- II–c–4. Exhaust pipes passing through watertight bulkheads.
- II–c–5. Materials for exhaust piping.
- II–c–6. Exhaust pipes for runabouts.
- II–c–7. Flexible exhaust pipe.
- II–d. Drip collector under carburetor.
- II–d–1. Arrangement of carburetor air intake.

III. Gasoline Fuel Tanks and Piping:
- III–a. Location and arrangement of fuel tanks.
- III–a–1. Portable fuel tanks not recommended.
- III–b. Materials for construction of fuel tanks.
- III–c. Construction of copper fuel tanks.

III. Gasoline Fuel Tanks and Piping—Con.
- III–c–1. Construction of ferrous metal fuel tanks.
- III–c–2. Riveting.
- III–d. Detailed recommendations for bracing fuel tanks, etc.
- III–e. Factor of safety and test recommendations for fuel tanks.
- III–f. Outlets on fuel tanks.
- III–f–1. Proper connection of outlets from fuel tank.
- III–g. Filling pipes and sounding holes, proper arrangement of.
- III–g–1. Filling pipe details.
- III–g–2. Sounding pipe details.
- III–h. Vents or reliefs, sizes of.
- III–h–1. Number of vents recommended.
- III–h–2. Antiexplosion fill and vent fittings.
- III–h–3. Flame traps on fuel tank vents.
- III–i. Gage glasses and try cocks.
- III–j. Auxiliary machinery fuel lines.
- III–k. Shut-off valves at tank and carburetor.
- III–k–1. Heat-actuated shut-off in fuel line.
- III–k–2. Types of valve recommended in fuel line.
- III–k–3. Cocks in fuel line not recommended.
- III–l. Material and arrangement of fuel lines.
- III–m. Thickness and diameter of fuel lines.
- III–m–1. Fittings used in fuel oil lines.
- III–m–2. Pipe fittings, non-ferrous metal.
- III–n. Strainer in fuel suction line.
- III–o. Various feed systems.
- III–p. Precautions recommended prior to storage.

IV. Ventilation:
- IV–a. General recommndations.
- IV–b. Compartments containing motors or tanks.
- IV–c. Motors and tanks in closed compartments.
- IV–d. Motors and tanks not in closed compartments.
- IV–e. Exhausters recommended on outlet ducts.
- IV–f. Installation and operation of electric exhauster fans.

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General

(*a*) **The following recommended practices are not a part of the regulations, but are a compilation of safety practices suggested by this Bureau. In suggesting and recommending these practices, it is not intended to infer that boats built or operated in a manner not to comply with the recommended practices contain unsafe features or are not properly operated. The omission of any devices or practices specified in the following recommended practices does not in itself make a boat unsafe. The Bureau further realizes that devices and practices used by many boat builders which differ from those contained herein accomplish the same purpose as the recommended practices and are therefore adequate.**

(*b*) It must be distinctly borne in mind that all petroleum vapors are heavier than air and consequently accumulate in the lowest part of the spaces containing them, where, being below head level, they are not readily detected by sense of smell and are unsuspected. Such accumulated vapors may lie dormant in the lower part of an engine-room space for a considerable length of time without mishap; however, should a source of vapor ignition be introduced, such as an open flame, a lighted cigarette, an electric spark, etc., a disastrous explosion may result. Hence, it is imperative to prevent the accumulation of explosive mixtures, first by keeping gasoline out of the bilges,[4] and second, by providing adequate means for ventilating such spaces. It is also necessary to eliminate all sources of vapor ignition from spaces containing explosive mixtures. Consideration should be given to the elimination of all unnecessary pockets in the hull where oil or petroleum vapors may accumulate. Attention is invited to the sketches showing recommended methods of arranging fuel-tank vents and fill pipes.

(*c*) The use of reliable equipment and suitable materials for building and equipping boats is essential. Wherever practicable, fire-retardant materials should be used. First-class workmanship is also necessary to insure proper construction and seaworthiness.

(*d*) From the standpoint of fire hazard, it is highly desirable that bilges of machinery and fuel tank spaces should be separated from bilges of accommodation spaces by bulkheads as tight as practicable, i. e., of double diagonal wood, steel plate, or equivalent construction. It is recommended that where practicable, two means of exit be provided from every compartment where persons may congregate or sleep.

(*e*) Shifting of heavy equipment, the rearrangement of which is likely to affect the stability of a vessel, should not be undertaken except upon the advice of a competent authority.

(*f*) The electric installation should be in keeping with the best modern safety practices, as many disastrous fires and explosions resulting in loss of life can be directly traced to defective wiring or other electrical equipment.

(*g*) Motorcraft owners should familiarize themselves with the regulations and customs of navigation, particularly when long cruises are contemplated. They should acquire a

[4] A half pint of gasoline in the bilge may create a potential explosive power of 5 pounds of dynamite.

knowledge of subjects vital to successful operation, such as reading a barometer, right-of-way, whistle signals, running lights, buoys, reefs, and other obstacles recorded on charts of the waters navigated.

(*h*) On long cruises the vessel should be provided with proper charts, a pair of compasses and a parallel rule. It is also necessary to have a properly adjusted compass. The compass should be checked on steel vessels at least once a year and on wooden vessels every 2 or 3 years. If engines, fuel tanks or other substantial metallic objects are changed, the compass should be checked after replacement is accomplished.

(*i*) A propulsion unit which is of such power as to be unsuited to the hull model and displacement, should not be installed. A responsible designer or builder should be consulted to avoid overpowering the vessel.

(*j*) A first-aid kit should also be carried.

(*k*) All boats should be provided with and carry on board at least one anchor of sufficient weight, together with an anchor cable of suitable character and strength to hold the boat under adverse wind and weather conditions. In general, cables should be of such length as to allow the boat to ride at anchor on a length of cable about 6 times the depth of the water which it may be necessary to anchor in. If the ground is such that the holding power is poor, a greater scope of cable may be necessary to prevent the boat from dragging her anchor. The longer the cable the greater the holding power. It is recommended that serious consideration be given to providing on board a second anchor and cable as a spare. Anchors and cables should be stowed in readily accessible locations in order that the boat may be quickly anchored in time of emergency, such as an engine breakdown on the lee shore or in heavy traffic. Motorboatmen on the coast are advised to familiarize themselves with the principles of the "sea anchor" or drag, as it may be used to keep the boat head to in heavy sea when anchoring may be impossible.

(*l*) Permanent moorings should be of ample weight, not less than twice that of the boat's bower anchor and more if scope is restricted by local conditions, to less than 5 depths at mean high water. Chain cable from mooring to buoy should be used and pennant from buoy to bitt should be a size larger than boat's anchor line or equivalent and parceled in way of the leader check to reduce chafing. Pennants should be examined periodically and proved in fit condition to withstand usual late season storms or renewed.

(*m*) Lifesaving equipment should be given proper care in order to prolong its life and assure its efficiency in time of need. Buoyant cushions should not be tossed around or otherwise roughly treated. Lifesaving equipment should be kept in a dry, well-ventilated place when the boat is not in use. Kapok-filled cushions and life preservers will absorb moisture, and should be thoroughly dried in the sun as frequently as possible. Their efficiency is greatly decreased if compressed when wet.

(*n*) Sea connections below the water line should have valves or cocks on or as near as possible to the inside of the hull planking or plating. Condition of nipples and locknuts or

flanges and bolting should be proven before putting boat over each season. Inside hose, clamped on a nipple without a valve or cock at the hull, should not be used.

(*o*) A reliable hand-operated bilge pump of sufficient size to take care of a serious leak should be provided.

I. Hulls

I–a. The hull should be thoroughly examined internally and externally. If of metal, it should be hammer-tested and any badly deteriorated plates, frames or rivets, etc., should be replaced. If the hull is of wood, the seams should be thoroughly searched and calked, if necessary, particular attention being paid to the garboard strake. Calking should be done only after the planking is soaked. Dry calking may result in permanent injury to the planking and fastenings. The fastenings should also be thoroughly examined to see that they are in good order. All ports and other openings in the vessel's hull should be gone over to see that they are properly gasketed and should be hose-tested for tightness.

I–b. A clean vessel, inside and outside, plus proper ventilation between frames and dead air spots preserves the finish and tends to prevent the wood from rotting. The bilges can be made sweet and clean by using a strong solution of washing soda or other similar compound after which they should be thoroughly flushed with water.

I–c. All underwater fittings, such as stuffing boxes, overboard discharges, seacocks, and toilet discharges should be thoroughly examined and any worn or deteriorated parts or fixtures should be renewed. The stuffing box around the propeller shaft should be repacked. The propeller shafting should be examined for defects and excessive wear and checked for alignment. The propeller should also be carefully examined and the edges of the blades faired or dressed as the case may be.

II. Machinery

II–a. The machinery should be of suitable type and size for the vessel. Amateur installations of automobile engines for marine duty are usually fraught with grief. The difficulties arise because of difference in characteristics and design. An engine for an automobile is designed to operate in a level position during the majority of its life with a load being applied intermittently. A marine engine, on the other hand, is designed to operate off level at an angle of several degrees and at constant load. Internal-combustion engines other than those designed for marine use cannot be properly cooled when installed in boats. Marine engines are more heavily water-jacketed and are designed to operate at a proper temperature without benefit of fan or radiator. As a consequence of the difference in characteristics and design, automobile engines installed in boats are nearly always improperly lubricated and improperly cooled. Under these conditions an engine cannot be expected to operate satisfactorily or last very long. The use of a reliable type of marine motor is strongly recommended.

II–b. Wherever possible to do so, a pan should be placed under the engine so that oil leaking out will be caught in the pan where it can be removed before entering the bilges.

II–c. The exhaust pipe should be arranged so as not to scorch or ignite adjacent woodwork and should be thoroughly examined for leaks. If leaks are found, the exhaust pipe should be renewed to avoid the exhaust gases from the motors entering the cabin or other interior parts of the vessel and overcoming persons therein. Protective grating over exhaust pipes should be provided to prevent gear coming in contact with hot pipes.

II–c–1. The exhaust manifold should be water-jacketed and cooled by discharge from a pump which operates whenever the engine is running; if not, woodwork within 9 inches should be protected by ⅛-inch asbestos board covered with sheet metal. A dead air space of not less than ¼ inch should be left between the protecting asbestos and the wood, and a clearance of not less than 2 inches maintained between the manifold and the surface of such protection.

II–c–2. It is recommended that all of the engine cooling water be discharged through the exhaust pipe and enter at a point as near to the manifold as practicable. Where the exhaust pipe is overhead or where a low level exhaust is not cooled by the entire discharge of circulating water, it is recommended that a length of not less than 12 diameters of such exhaust pipe adjacent to the manifold be water-jacketed and cooled in same manner as manifold, and that remainder of pipe be kept clear of internal woodwork at least 1½ inches and properly supported by non-combustible hangers or blocks.

II–c–3. Where the first 12 diameters of exhaust are neither jacketed nor cooled by entire discharge of circulating water, woodwork within 6 inches of any part of the exhaust should be protected by ⅛-inch asbestos board covered with sheet metal. A dead air space of not less than ¼-inch should be left between the protecting asbestos and the wood, and a clearance of not less than ½ its diameter should be maintained between the pipe and the surface of such protection.

II–c–4. Where exhaust lines pass through water-tight bulkheads, non-combustible packings should be installed. Exhaust piping should be carried to the point of escape without traps and with a minimum number of bends or elbows. Ninety-degree elbows or bends of less than 5 diameters radius are not recommended.

II–c–5. Cast or wrought iron pipe is recommended for exhausts. Where lighter weight is essential, copper tubing may be used provided that, if not jacketed as recommended in paragraph II-c-1, the full discharge of circulating water should pass through the tube. For cruisers and commercial craft, gage of copper exhaust tubing should not be lighter than 2 inches O. D.—No. 14 B. W. G.; 4 inches O. D.—No. 12 B. W. G.; 6 inches O. D.—No. 10 B. W. G.

II–c–6. In runabouts, where extreme lightness is essential, exhaust tubing thickness of No. 16 B. W. G. may be used up to 3 inches O. D.

II–c–7. When flexibility is desirable in an exhaust line it is recommended that if non-metallic sections are used the following provisions be complied with:

1. A substantial length of water-cooled metal exhaust pipe and a water-cooled silencer should be installed between the flexible section and the exhaust manifold.

2. All cooling water from the motor should pass through the flexible section.

3. Material of the flexible sections should be specially adapted to resisting the action of oil and heat.

4. The flexible section should be suitably reinforced to prevent crushing or panting by extra thickness of wall or built-in wire winding.

5. As installed, it should not be bent sufficiently to unduly stress or crimp the inner or outer linings or to permit local impingement of exhaust gases.

II–d. All carburetors, except the downdraft type, should have integral therewith or properly connected thereto, a closed drip collector of adequate capacity.

II–d–1. Air intakes should be so directed that backfire cannot blow down into the bilge and should be fitted with a backfire flame arrester, in accordance with the regulations.

III. Gasoline Fuel Tanks and Piping

III–a. It is recommended that fuel tanks, if practicable, be located in separate water-tight compartments above the load line and mounted in a pan or metal-lined water-tight flat fitted with overboard drains. Such pan or flat is not recommended where the bottom of the tank is below the water line. Tanks should be arranged so as to facilitate removal and exterior examination. It is not recommended that tanks be located in remote spaces, as such location will necessitate excessive lengths of fuel piping. All tanks should be substantially secured in position to prevent any movement when the boat rolls or pitches.

III–a–1. Portable tanks below decks are not recommended.

III–b. Fuel tanks should be constructed of suitable non-corrosive metal or alloy of thickness not less than No. 18 gauge (U. S. Std.), or of iron or steel of thickness not less than No. 14 gauge (U. S. Std.), except that on light runabouts where cylindrical iron or steel tanks are used, those not exceeding 35 gallons capacity should be of not less than 18 gauge (U. S. Std.), and those of 35 to 70 gallons capacity of not less than 16 gauge (U. S. Std.). Steel or iron tanks should be galvanized both inside and outside, preferably by the hot dipped process, after completion. Those not galvanized should be kept well coated on the outside to prevent corrosion. Where possible, tanks should be lifted for examination annually and installation should be designed with this end in view.

III–c. Seams of copper tanks should be rolled, riveted and soldered or rolled and brazed. All outside rivet points and heads should be soldered or brazed.

III–c–1. Seams of ferrous metal tanks should be welded, or riveted and welded.

III–c–2. All outside rivet points and heads should be welded.

III–d. If fuel tanks have flat heads or are not cylindrical, they should be fitted with diaphragms, of same character of material as tanks, to break the wash of contents; and should be properly braced on flat surfaces by diaphragms or other stays to prevent bulging

and panting. Diaphragms in tanks should be well fastened by angles or flanges. Flanges should be bent to an inside radius of not more than twice the thickness of the flanged sheet, and the riveting, welding or brazing should be as close to the throat of the flange as practicable. For pressure fuel tanks, the cylindrical type is recommended.

III–e. Tanks should be designed with a factor of safety not less than 4. Gravity tanks should be tested by static head above tank top of 10 feet of water, without showing leakage or permanent deformation. Pressure tanks should be tested to twice the designed working pressure of that required for gravity tanks, whichever is the greater, without leakage or permanent deformation.

III–f. Outlets on gas fuel line for drawing loose gasoline for any purpose should not be fitted. Drains in the bottom of fuel tanks are not recommended, but where fitted should be closed by plugs or plugged pipes threaded into spuds, riveted and soldered, welded or brazed to the tank.

III–f–1. It is recommended that all outlets pass through the top of the tanks. In cases where outlets pass through side or bottom, connections should be threaded into spuds riveted and soldered, brazed or welded to the tank; and where the tank is large enough to permit inside access, an internal gate valve shut-off with extension rod packed at tank top should be fitted.

III–g. Filling pipes and sounding holes should be so arranged that vapors cannot escape to the inside of the boat and overflow of gasoline, when filling, will run overboard. A pipe made tight to tank and to filling plate on deck outside of cockpit and coamings will provide this safeguard.

III–g–1. Filling pipes should extend nearly to the bottom of the tank, and a strainer of non-corrodible wire mesh fitted in the throat of the fill is recommended.

III–g–2. In cases where, on account of offsets the sounding hole has to be located otherwise than as above, it should be not larger than ½-inch I. P. S. and such hole should be kept closed at all times except during the act of sounding.

III–h. Vents or reliefs leading outboard should be provided on all gasoline tanks. The following sizes are recommended:

0 to 100 gals	⅜ inch I. P. S.
101 to 150 gals	½ inch I. P. S.
151 to 300 gals	¾ inch I. P. S.
301 to 500 gals	1 inch I. P. S.

III–h–1. Two vents or reliefs having a combined area equivalent to that specified above may be used in place of a single vent or relief. On boats liable to heel vents on port side should be led to starboard and vice versa.

III–h–2. Anti-explosion combined fill and vent fittings may be used in place of independent fill and vent lines.

III–h–3. Outlets of fuel tank vents terminating on the hull should be fitted with approved flame traps inside of the hull as protection against flareback from an outside source

of ignition. Under no circumstances should vents on gasoline tanks terminate in an enclosed space such as an engine compartment nor under deck.

III–i. Gauge glasses and try cocks should not be used. Other methods of indicating the level of the liquid may be used, provided, however, that they are so arranged as not to expose the liquid or vapor in cabin, cockpit or under deck, or to permit vapor to drift below.

III–j. It is recommended that auxiliary feeds draw from the main fuel line, but where auxiliary gasoline tanks are necessary, they should be of a type permitting the same fill pipe and vent arrangement as required on main tanks in order to avoid handling of loose gasoline under deck. Open fills on tanks integral with auxiliaries located below decks are dangerous and are not recommended.

III–k. A shut-off valve should be installed as close to each tank as practicable and one as close to each carburetor as practicable. The handles of all shut-offs at the tanks, whether external or internal, should be readily accessible. Arrangements should be provided for operating them from outside the compartments in which the tanks are located, preferably from on deck.

III–k–1. A heat-actuated device to shut off the fuel supply near the tank automatically in event of fire is recommended.

III–k–2. Valves for gasoline fuel lines should be of non-ferrous metal with ground seats and installed to close against the flow. The tinning of cast bodies and bonnets and the use of a type which does not depend solely on packing to prevent leakage at the stem while in fully open position are recommended.

III–k–3. Cocks of any type are not recommended for use in gasoline fuel lines.

III–l. Fuel lines should be of seamless drawn annealed copper tubing or iron pipe size copper pipe. They should be run in sight whenever practicable, protected from mechanical injury and effectively secured against vibration by neat fitting, soft, metal-lined or soft, non-ferrous metal clips with no sharp edges in contact with tubing. Where passing through steel decks or bulkheads, lines should be protected by close-fitting ferrules of non-abrasive material. When an engine is mounted floating or on soft packing pieces, a short length of flexible tubing with proper fittings should be installed in the line at or near the carburetor to prevent damage by vibration. Such flexible section or a copper loop is recommended for connection between fuel line and engine of all types of mounting.

III–m. Tubing wall thickness should not be less than the following:

Outside Diameter of Tubing	Thickness	
	Stubbs Gage (B. W. G.)	Inches
1/8", 3/16", 1/4"	No. 21	0.032
5/16", 3/8"	No. 20	.035
7/16", 1/2"	No. 19	.042

III–m–1. Tube fittings should be of non-ferrous drawn or forged metal and of the flared type at least equal to those of S. A. E. "Standard Practice Code for Refrigeration and Marine."* It is important that tubing be cut square and truly flared by tools designed for these purposes. Annealing of tube ends before flaring is recommended.

III–m–2. Pipe fittings should be of non-ferrous metal, standard pipe threaded and joints soldered after being made up. The tinning of cast fittings is recommended.

III–n. A strainer of suitable type with bolted or dogged bonnet should be fitted in the fuel suction line within the engine compartment and supported to take its weight off the line. A shut-off should be fitted on each side of strainer to permit opening and cleaning. Strainers should be of type opening on top for cleaning screens.

NOTE: Attention is drawn to paragraph III–f which warns against outlets for drawing loose gasoline in the engine compartment.

III–o. Of the various feed systems in use, such as mechanical, tank pressure, vacuum, gravity and electric diaphragm, the direct-connected mechanical is preferred.

III–p. Gasoline tanks and fuel lines should be drained when the boat is placed in storage or laid up for any length of time to prevent the formation of a sort of sludge-like precipitate resulting from a reaction of the gasoline with fuel tank and fuel lines. Owners should also avoid the use of treated gasolines as it has been found that they react with some types of tanks and fuel lines in such manner as to completely clog the fuel lines and carburetor.

IV. VENTILATION.

IV–a. All enclosed parts of the vessel should be provided with means for proper ventilation. The requirements below are recommended by the Marine Section of the National Fire Protection Association.

IV–b. Any compartment or space in which a motor is located, particularly the lower portion and bilges, should be provided with ventilation effective to remove possible accumulation of flammable or explosive vapor. Tank compartments should be similarly ventilated when practicable.

IV–c. To meet this requirement, the following is recommended:—Where motors and/or tanks are in closed compartments; permanently open and adequate inlet and outlet ventilating ducts extending to the bilges should be installed; two inlets leading to the wings at one end of the compartment and two outlets from the wings at the opposite end.

IV–d. Where motors and/or tanks are not in closed compartments; at least one such duct should be installed in the fore part of the boat and one in the after part.

IV–e. Where feasible, it is also recommended that outlet ducts be fitted with wind-actuated self-trimming or rotary exhauster heads or that power-operated exhausters be installed in each outlet duct. If exhausters are used, motors should be installed outside of the ducts and as high above the accommodation flooring as practicable. Size of vents should

*Published in the handbook of the Society of Automotive Engineers.

be approximately proportional to the beam of the boat with 2 sq. in. of aggregate vent area per foot of beam as a minimum.

IV–f. Electric exhauster fans should be properly installed and all wiring and electrical apparatus incident thereto should meet the applicable requirements set forth under Electrical Equipment. Under no circumstances should circuit-interrupting devices or other electrical equipment, which, when operated, are liable to form an electric arc (source of vapor ignition), be installed in spaces liable to contain petroleum vapors. As the majority of explosions occur when the starter is operated, before the carburetor air intake has had an opportunity to do its unknown share of removing the petroleum vapors from the bilge, it is strongly recommended, in the interests of safety, that the fan be operated at least 5 minutes before starting and after stopping the engine. On vessels which are not fitted with an exhaust fan, all means of natural ventilation should be made effective, such as trimming ventilator cowls to the wind or opening doors and ports before starting the engine. Lighting matches or stoves, operating electrical devices or performing any other acts which may produce a source of vapor ignition should be avoided until after the vessel is thoroughly aired out.

V. Stoves, Heaters, Boilers, Refrigerators, Lamps, Etc.

V–a. The fuel used for cooking, heating, refrigeration, etc. and the equipment for the safe use of such fuel is a matter of great importance. Fuel tanks for cooling, heating, etc. should comply with the applicable provisions of Section III of these recommendations. The types of fuel in general use, arranged in order of the safeness, beginning with the safest and ending with the most hazardous, are listed as follows:

1. Electricity
2. Coal, coke or wood
3. Canned heat
4. Alcohol
5. Kerosene
6. Liquefied and compressed gas
7. Gasoline

V–b. For the reason that galley stoves are liable to promiscuous, unskilled or ignorant operation more than any other piece of boats' gear involving fire risk, it is important that such equipment should be selected and installed with a view to minimizing both the personal and physical hazards.

V–c. Cooking or heating stoves should not be located in the same compartment with machinery or gasoline tanks; but when such arrangement is unavoidable, stoves should be placed as remote as possible from carburetors and tank connections.

V–d. Woodwork within 12 inches of bottom and sides and 24 inches over top of stoves should be protected with ⅛-inch asbestos board covered with sheet metal and an air space of ¼-inch left between the protecting asbestos and the woodwork.

V–e. Fixed stoves should be permanently secured in place. Portable stoves are not recommended, but if carried should be rigidly secured in place well clear of woodwork when in use.

V–f. On stoves burning liquid fuel, oven should not be under the open burners on account of the danger from overflow if the burners are extinguished.

V–g. Galley Stoves—*Coal, charcoal, or wood.*—Clearance of at least 3 inches between bottom of stove and deck is recommended unless installed on a hollow tile base. Stove pipes should be of extra heavy material and care should be taken that they are properly insulated and securely fastened to avoid movement or collapse in a seaway.

V–g–2. *Alcohol, solid and fluid.*—Containers of solidified alcohol should be properly secured on a fixed base to prevent sliding or overturning in a sudden roll of the vessel.

V–g–2–a. For fluid burners where wet priming is used, a catch pan not less than ¾-inch deep should be secured inside the frame of the stove or metal protection thereunder flanged up ¾-inch to form a pan.

V–g–3. Gasoline should not be used for priming.

V–g–4. Large fuel tanks for fixed stoves should be separate therefrom and mounted either outside or inside with outside fill and vent. Small units of a type with integral tanks properly baffled from the burners may be used.

V–g–5. Either pressure or gravity feed is permissible, but where gravity or siphon is used an easily accessible shut-off valve should be fitted in fuel line at tank, and if tank is outside, also at the stove.

V–g–6. *Fuel oil or kerosene.*—Where wet priming is used, a catch pan not less than ¾-inch deep should be secured inside the frame of the stove, or metal protection thereunder flanged up ¾-inch to form a pan.

V–g–7. Gasoline should not be used for priming.

V–g–8. Fuel tanks for fixed stoves should preferably be separate therefrom, mounted either outside, or inside with outside fill and vent.

V–g–9. Either pressure or gravity jet feed is permissible. Bubble feed or any system which may be affected by list or roll of the vessel should not be used. On gravity or siphon tanks, an easily accessible shut-off valve should be fitted in fuel line at tank, and if tank is outside, also at the stove.

V–g–10. Burners should not be primed when hot and burner tips should be kept clean to avoid choke, extinguishment and consequent flooding.

V–g–11. *Gasoline.*—Gasoline stoves should not be used on boats.

V–g–12. *Liquefied or compressed gas systems.*—Systems, including regulating and safety equipment, should be listed by Underwriters' Laboratories, Inc., for marine use.

V–g–12–a. Vapors from petroleum gases [5] are heavier than air, regardless of their varying rates of evaporation. Such vapors will tend to sink to the bottom of an enclosed compartment into which they are released and are not readily dispelled by overhead ventilation. Acetylene, methane and coal gas are lighter than air.

[5] Overhead ventilation does not readily remove petroleum vapors from the galley floor; therefore an exhauster fan, properly installed with at least a 3-inch ventilator extending nearly to galley floor, should be installed whenever liquefied or compressed gas is used for cooking.

V–g–12–b. All of these vapors when mixed with air in certain proportions are explosive. Safety requires absolute prevention of vapor escape.

V–g–12–c. Cylinders and drums and their pressure relief devices should be Interstate Commerce Commission standard for the contained product and should be filled according to Interstate Commerce Commission regulations.

V–g–12–d. Systems introducing fuel below decks in gaseous form are regarded as the less hazardous of the liquefied or compressed gas systems. Each cylinder in such systems should have a stop valve directly on the cylinder outlet and the system should be provided with a regulating device limiting the pressure at the burners to not over one pound per square inch (28 in. water column).

V–g–12–e. Systems introducing fuel below decks in liquid form are regarded as the more hazardous of the liquefied or compressed gas systems. Each drum in such systems should have a stop valve, or a check valve in combination with a stop valve, directly, on the drum outlet; and where gas may attain a vapor pressure of over 20 pounds per square inch gauge at 100° F. the system should be provided with a regulating device limiting the pressure at the burners to not over 20 pounds per square inch.

V–g–12–f. In both systems the low pressure side of the regulator or the L. P. line should be provided with a pressure relief device and the chamber above the diaphragm with a vent, both of which may discharge through a common outlet. (See par. V–g–13 to V–g–13–j, inclusive.)

V–g–12–g. In multicylinder or multidrum systems, a stop valve should be provided in each line from the container to the regulator or manifold in addition to the valves required at the containers.

V–g–12–h. Continuous burning or pilot lights are not recommended.

V–g–12–i. Only dry primed burners should be used.

V–g–12–j. An automatic device to shut off gas supply in case flame is extinguished should be fitted to oven burners and is recommended for other burners on the stove when practicable.

V–g–12–k. To facilitate detection of possible leaks, an odorant should be added to fuel gases which do not emit a natural distinctive odor.

V–g–13. *Installation of liquefied or compressed gas systems.*

V–g–13–a. Comprehensive printed instructions and labeled diagram should be furnished with each system, covering details of proper installation.

V–g–13–b. Only the kind and specification of gas for which the system is designed and listed should be used.

V–g–13–c. Cylinders or drums, and regulating and safety equipment should be substantially secured and located so that vapor escaping from any cause cannot reach the bilges, machinery space, accommodations or other enclosed spaces.

V–g–13–d. Such locations are confined to open deck or cabin top or in a dummy stack, provided the deck in way is vapor-tight to the compartment below. Locations under deck,

in a cockpit and on portions of the deck enclosed at the sides by bridge or cabin structures, are not recommended.

V–g–13–e. Cylinders or drums and their regulating and relief equipment should be protected from climatic extremes by a box or housing (as dummy stack) vented to the open air by holes near the bottom for heavy gases and near the top for light gases.

V–g–13–f. The discharge from the low-pressure relicfs should be led preferably to the stern, or, if not feasible, to a point at least 2 feet distant (and if possible farther) from any part of an opening to the interior of the boat or from a motor exhaust which is below the level of such discharge. Outlet ends should be turned down to prevent choking the line with water.

V–g–13–g. For low-pressure (gaseous phase) systems, line and branches from the regulator to the burners should be seamless soft copper of the same gauge thickness as required for gasoline feed lines (see III–m); except that for acetylene, soft brass or composition tubing should be used. (Unalloyed copper is not suitable for use with acetylene.)

V–g–13–h. For high-pressure systems (liquid phase) and lines from cylinders to regulator in low-pressure systems, the tubing should be seamless soft copper $\frac{3}{4}$ inch O. D. with wall thickness $\frac{3}{64}$ inch or No. 18 Stubs gauge (B. W. C.).

V–g–13–i. Fittings for standard gauge tubing should be of flared marine type (See Section III-m); and for heavy gauge tubing, either of the same type, but with tube and thoroughly annealed before flaring, or of S. A. E. soldercd type, but of drawn or forged non-ferrous metal and using only high-temperature solder or brazing.

V–g–13–j. Lines should be exposed to sight but protected from mechanical injury as far as possible and substantially secured against vibration by neat-fitting soft metal-lined or soft non-ferrous mctal clips with no sharp edges in contact with tubing. Where passing through steel decks or bulkheads, lines should be protected by close-fitting ferrule of non-abrasive material.

V–g–14. Operation of liquefied or compressed-gas system.

V–g–14–a. Brief printed instructions and labeled diagram for operation and maintenance should be posted where visible for ready reference.

V–g–14–b. Changing of cylinders or drums should be supervised by one of the licensed personnel when such officers are carried, or by other responsible person when no such officers are carried.

V–g–14–c. In single-container systems, when container is to be changed, operator is advised to close the stop valve on the containcr and burn out the gas content of the line by lighting all burners, then *shut off the burners.* He should then disconnect the empty container, leaving the *stop* valve on the container and keep closed, then connect the fresh container.

V–g–14–d. In types necessitating transfer of an attached fitting containing the stop valve, operator should make this transfer on deck in the open, remotc from openings leading below and from sources of ignition.

V–g–14–e. In multi-container systems, when the container in use becomes exhausted, operator should shut off all burners before turning on the reserve container. When container is to be changed he should shut both container stop valve and stop valve in the line to the regulator. It is then unnecessary to burn out the gas content of the low-pressure lines, and change of containers may be executed as in a single-container system.

V–g–14–f. In either a single or multi-container system, after turning on a fresh container, it is recommended that all burners be lighted for sufficient time to insure that there is no air in the lines to interrupt a continuous flow of gas; then shut off burners and container stop valve, and test for leaks and faulty or improperly adjusted regulator.

V–g–14–g. Unconnected reserve containers should be subject to the same stowage restrictions as those in service. Empty containers should be kept closed by the means provided (stop valves or plugs) whether or not connected, and unconnected empties put ashore as soon as practicable.

V–g–14–h. Particular care should be taken against snuffing a flame from boil over, gust of air or any other cause, and frequent attention should be given to joints and glands to insure constant tightness.

V–g–14–i. Systems shall be provided with a pressure gauge. At installation they should be tested with air or water and proven tight at not less than twice the service pressure.

V–g–14–j. Thereafter, frequent tests at service pressure should be made (bi-weekly recommended) by closing the cylinder valves and observing the gauge. If tight, there should be no noticeable drop in 10 minutes. Trial for location of leaks should be done with soapsuds or other noncombustible substance and not with flame.

V–h. Cabin heaters and hot-water boilers.

V–h–1. Gasoline should not be used for fuel, and bubble-feed burners are not recommended for any kind of fuel. Portable kerosene heaters are not recommended.

V–h–2. The recommendations for installation and operation of galley stoves (V–a to V–g–14–j) should be observed where applicable.

V–h–3. All gas-burning heaters should be equipped with an automatic device to shut off gas supply to the heater in case the flame is extinguished.

V–h–4. Continuous burning or pilot lights are not recommended.

V–i. *Ice machines.*—Machines operated by flame are not recommended. Electric machines should have motors preferably located on top of the cabinets, or if separate from cabinets, well above the bilges. (For wiring see section VI.)

V–j. *Lamps and Lanterns.*

V–j–1. It is no longer necessary to rely on oil lamps or lanterns for lighting since portable electric lanterns and flashlights are available and are much safer for use in case of failure of the main lighting system; however, where oil lamps and lanterns are carried, they should conform with the following paragraph.

V–j–2. Gasoline-burning lamps and lanterns are not recommended. Oil lamps should have metal bodies and, except hand lanterns, should be kept in brackets well secured or

suspended and stayed. They should be secured in the brackets by an efficient device for holding them in place and should have metal shields over the chimneys. Hand lanterns when suspended should be secured by clips or lashings. Kerosene should be carried in receptacle with a tight cover, and this receptacle, and oil-burning lamps and lanterns not in service brackets, should be kept in a metal-lined locker which is vented to the outside air. Oil lamps or lanterns should never be carried into compartments likely to contain petroleum vapors, such as engine rooms or fuel-tank compartments.

VI. Electrical Equipment

VI–a. Wiring or electrical equipment on motor craft should be thoroughly inspected at least annually by a person competent to determine its actual condition in accordance with the following:

VI–a–1. All electrical installations operating at potentials of 32 volts and above should comply with the "Recommended Practice for Electrical Installations on Shipboard—1940 Revision" published by the American Institute of Electrical Engineers—33 West Thirty-ninth Street, New York.

VI–a–2. All electrical installations operating at potentials less than 32 volts should comply with the following:

VI–a–2–a. Generators and motor should be placed in dry, accessible and adequately ventilated locations. Independent generators and motors should be mounted on foundations as high as practicable above the floor to avoid damage by splash from the bilges or by coming in contact with low-lying vapors, and should not be located in low or pocketed positions unless they are of explosion-proof type. Generators and motors which are an integral part of the propelling unit should be fused at the generators.[6]

VI–a–2–b. Switchboards should be placed in dry, accessible and adequately ventilated locations, preferably outside of the engine compartment. The backs should be metal encased and provision shall be made for access thereto. All uninsulated current-carrying parts should be mounted on nonabsorbent, noncombustible, high dielectric composition.

VI–a–2–c. A master switch should be installed on the main panel, and where the starting motor is on an independent circuit, an additional switch should be installed.

VI–a–2–d. Switches other than those mounted on the switchboard should be of the enclosed type. Each circuit should be fused to not more than the current-carrying capacity allowed for the conductor. (See VI–a–2–g.)

VI–a–2–e. Batteries should be so located that gas generated in charging can be easily dissipated by natural or induced ventilation. Acid batteries should be set in lead pans. Alkaline batteries should be insulated from possible metal contact and consequent short circuit.

[6] Low voltage installations do not warrant admission of sub-standard material and workmanship in motor craft where the possible presence of flammable or explosive vapors renders a spark or incandescence from a physical failure liable to entail serious consequences. Where explosion-proof apparatus is specified, it should conform to requirements for such apparatus contained in the National Electrical Code with respect to Class I hazardous locations.

VI–a–2–f. Batteries should be secured against shifting with the roll of the boat and should be easily accessible for observation of terminals, testing and replenishment. Preferably, batteries should not be located in the same compartment with a gasoline tank or engine; but where location elsewhere is impracticable, they should be effectively screened off by a cage or similar structure in order to minimize the danger of accidental spark through dropping a metal object across terminals. Battery terminals should be of the soldered lug type.

VI–a–2–g. Ignition wiring as supplied or recommended by engine makers is generally acceptable. Light and power wiring sizes should be according to Chapter 10, Table 1, of the National Electrical Code for current to be carried; except that as a precaution against rupture by vibration, all conductors should be of the stranded type and no conductor smaller than No. 12 A. W. G. should be used. Capacities in Chapter 10, Table 1, are for standard voltages, but the fact that substandard voltages, to be effective, permit only a minimum voltage drop is the consideration in determining wiring sizes.

VI–a–2–h. The size of conductor recommended when an allowable voltage drop and current are given can be readily determined by the following formula:

$$\text{c. m.} = \frac{K \times I \times L\ (\times 2 \text{ for two wire circuit})}{E}$$

Where: c. m. = Circular-mil area of conductor
K. = 10.8 (a constant representing the mil-foot resistance of copper)
I. = Load current in amperes
L. = Length of conductor from center of distribution in feet
E. = Voltage drop at load in volts

VI–a–2–i. After computing the circular-mil area recommended, reference may be made to the following table for selection of the required conductor gauge size. When the computed circular-mil area is found to be less than any value given in the table, the next larger size conductor should be used.

ALLOWABLE CARRYING CAPACITIES OF CONDUCTORS

Gage No. A. W. G.	Diameter of bare solid conductor in mils	Area of solid or stranded conductor in circular mils	Capacity of rubber insulated wire, amperes	Gage No. A. W. G.	Diameter of bare solid conductor in mils	Area of solid or stranded conductor in circular mils	Capacity of rubber insulated wire, amperes
16	50.8	2,583	6	3	229.4	52,630	69
14	64.1	4,107	15	2	257.6	66,370	80
12	80.8	6,530	20	1	289.3	83,690	91
10	101.9	10,380	25	0	325.0	105,500	105
8	128.5	16,510	35	00	364.8	133,100	120
6	162.0	26,250	45	000	409.6	167,800	138
5	181.9	33,100	52	0000	460.0	211,600	160
4	204.3	41,740	60				

VI–a–2–j. The following tabulation, derived from the preceding formula, indicates the recommended conductor sizes for general current values and lengths of conductor at recom-

mended maximum voltage drops of 1.5 volts for a 6-volt supply and 2 volts for a 12-volt supply. Other values may be computed by the formula.

CONDUCTOR SIZES FOR AMPERES—LENGTHS

6 VOLTS TWO WIRE—1.5 VOLT DROP

[Wire sizes (A. W. G.)]

Total current on circuit, amperes	Length of conductor in feet from source of current to most distant fixture										
	10	15	20	25	30	35	40	45	50	55	60
5	12	12	12	12	12	12	12	12	12	12	12
10	12	12	12	12	12	12	12	10	10	10	10
15	12	12	12	12	12	10	10	10	8	8	8
20	12	12	12	10	10	10	8	8	8	8	6
25	12	12	10	10	8	8	8	8	6	6	6
12 VOLTS TWO WIRE—2 VOLT DROP											
5	12	12	12	12	12	12	12	12	12	12	12
10	12	12	12	12	12	12	12	12	12	12	12
15	12	12	12	12	12	12	12	10	10	10	10
20	12	12	12	12	12	12	10	10	8	8	8
25	12	12	12	10	10	10	8	8	8	8	8

VI–a–2–k. Light and power conductors for interior wiring should be rubber insulated in accordance with Chapter 9, Section 92405 of the National Electrical Code. These classifications are as follows: Type R (single conductor); Type RD (twin conductor).

VI–a–2–l. Thickness of rubber insulation is $\frac{4}{64}$ inch for wire sizes of No. 14 to No. 9 A. W. G. inclusive and $\frac{5}{64}$ inch from No. 8 to No. 2 inclusive.

VI–a–2–m. Conductors passing to the exterior should be run in metal kick-pipes or stuffing tubes to water-tight receptacles. From such receptacles to exterior fixtures, conductors shall be type "S" flexible cord in accordance with Chapter 10, Table 31, of the National Electrical Code.

VI–a–2–n. For intercommunication wiring, rubber-covered single-braid IC cable, type RF–32 (rubber-covered fixture wire, Underwriters' Laboratories, Inc. standard for flexible cord and fixture wire—$\frac{1}{32}$ inch insulation) stranded and not smaller than No. 16 A. W. G. or equivalent, should be used. Commercial bell wire should not be used.

VI–a–2–o. All wiring should be run as high as practicable above the accommodation flooring. Surface wiring should be protected in accordance with the National Electrical Code; Article 93461 for rigid metal conduit, Article 93481 for electric metallic tubing, Article 93521 for surface metal raceway, and Article 93561 for cellular metal floor raceways. However, the extended use of conduit and metallic tubing is not recommended because of the liability of moisture accumulating therein.

VI–a–2–p. Concealed wiring may be unprotected, but should be secured by neat-fitting, non-ferrous cleats with rounded edges spaced not over 14 inches apart.

VI–a–2–q. Lead-sheathed unarmored conductors and conductors armored with spiral-wound flat metal stripping should not be used. Conductors armored with metallic basket weave or helical wire, with or without inside lead sheathing, in accordance with the A. I. E. E. Recommended Practice for Electrical Installations on Shipboard, may be used.

VI–a–2–r. Wiring joints and splices should be mechanically secure. Unless a splice is made by a solderless wire connector, listed by Underwriters' Laboratories, Inc., it should be thoroughly soldered. Where ends of stranded conductors are to be clamped under terminal screws, they should be formed and soldered unless fitted with solderless lugs listed by Underwriters' Laboratories, Inc.

VI–a–2–s. Splices, unless provided with insulated wire connectors listed by Underwriters' Laboratories, Inc., should be first taped with rubber and then with friction tape to afford insulation equivalent to that of the conductors joined.

VI–a–2–t. Accessories, such as switches, fuses, and sockets, shall be standard National Electrical Code types for the loads to be carried and shall be of types listed by Underwriters' Laboratories, Inc.

VI–a–2–u. Lighting and power switches and light fixtures in the engine room, forepeak, lazarette and galley (if gas is used for the range) should be of the explosion-proof type. The use of explosion-proof switches throughout under deck is recommended.

VI–a–2–v. Junction boxes (instead of junction blocks) and Edison base lamps and sockets (instead of bayonet lock type) are recommended.

VI–a–2–w. Magnetic starting switches approved by Underwriters' Laboratories for use in hazardous locations, mounted close to the starting motors and explosion-proof starting motors and generators are also recommended.

VII. Lightning Protection

VII–a. On wooden boats it is recommended that attention be given to protection against lightning damage by grounding vertical projections in general compliance with land practice as recommended by the N. F. P. A. Code for the Protection of Life and Property Against Lightning, pending specific recommendations for marine installations to be promulgated.

VIII. Fire Extinguishing Equipment

VIII–a. All hand extinguishers and fixed extinguishing systems should be on the approved list of the U. S. Bureau of Marine Inspection and Navigation of the Department of Commerce.

VIII–b. *Smothering Systems.*

VIII–b–1. A fixed carbon-dioxide fire smothering system of a type approved by the Bureau of Marine Inspection and Navigation, Department of Commerce, is recommended for motor and gasoline-tank compartments, bilges and galleys. The quantity of gas required for such smothering systems can be determined in accordance with Table IV in the

regulations. Where bilges are open or communicating to more than one space, such spaces together with bilge should be considered as one in determining the capacity of the system.

VIII–b–2. Systems may be manually or automatically operated.

VIII–b–3. Spaces to be protected by smothering systems should be enclosed and contain only the usual number of ports, companionways and door openings.

IX. Operation

IX–a. Attention is again called to the hazard involved in the handling of gasoline. An atmospheric concentration as low as 1¼ percent is practically odorless, but is sufficient to create a mixture which may be exploded by a slight spark. Such explosive vapor may travel a considerable distance from the point of leakage.

IX–b. Gasoline vapors are heavier than air and will not escape from low-lying pockets, such as bilges or tank bottoms, unless drawn or forced out. A recently emptied gasoline tank is in its most dangerous condition. The following precautions are recommended therefore in order to reduce the fire and/or explosion hazard:

IX–b–1. All gasoline connections should be tight.

IX–b–2. Care should be taken not to expose gasoline in closed spaces through spilling, drawing off, storage or use in any kind of cleaning, no matter how small the quantity.

IX–b–3. Ventilation as adequate as possible should be insured by attention to all arrangements therefor, both before starting and while running.

IX–b–4. Naked lights, however small, should not be carried into compartments where gasoline vapor may be present.

IX–b–5. The entire boat and especially the engine compartment should be kept clean and free from flammable rubbish, loose oil and grease, and dirty waste or rags. Clean waste and rags should be kept in metal-lined lockers or containers. Similar receptacles should be provided for waste and rags coated with oil or paint; but such accumulation should be kept to a minimum by frequent disposal ashore.

IX–b–6. In fueling, before tank fills are opened or gasoline brought on board, all engines, motors and fans should be shut down, galley fires put out, and all doors, ports, windows and hatches closed. On completion, after hose or cans have been removed, any spillage should be wiped up and the boat opened. If practicable, it should remain open for at least five minutes before starting any engine or motor or lighting a fire. No smoking should be permitted during a fueling operation.

IX–b–7. In order to guard against a possible spark during fueling operation, nozzle of the hose or can should be put in contact with the fill pipe or funnel *before* starting to run in gasoline and this contact should be kept until after the flow has stopped. When main and auxiliary machinery is mounted on rubber, a suitable grounding connection should be provided to a metal portion of the hull or hull fittings to prevent the accumulation of a static charge.

Note.—There is a serious hazard from static discharge unless this rule is observed.

IX–b–8. Lockers in which oiled clothing is carried should be cool and well ventilated on account of the danger of spontaneous combustion.

IX–b–9. Paint and varnish removers are generally highly flammable and particular caution should be exercised during use of such to see that there is ample ventilation and no open lights, fires, or smoking.

X. Diesel-Powered Boats

X–a. *Fuel tanks.*—The area of the vent on tanks that may be filled under pressure should equal at least the area of the filling pipe.

X–b. *Piping.*—Fuel delivery piping on engines should be of seamless steel or annealed seamless brass or copper tubing and tested to not less than one and one-half times the maximum working pressure. Connections should be made up with ground joints or on continuous metallic gaskets in counterbores.

X–c. *Heating coils.*—Where water is used as a heating medium in service tanks, coils should be easily removable. The coils should be kept tight to insure against oil leakage into muffler water-heater with possible consequent explosion.

X–d. *Purifiers.*—Where fuel requiring heating above its flash point is used in centrifugal purifiers, the purifiers and all connections thereto and therefrom should be absolutely gastight. It is recommended that the purifier be located in a compartment separate from the engine room. When electric motor driven, motors should be of explosion-proof type with controller outside of compartment in which purifier is located.

X–e. *Exhaust.*—Exhaust piping should be in accordance with the applicable provisions of Section. II–c, except that no copper pipe should be used for Diesel exhausts. Where exhaust pipe and/or muffler is not water-jacketed, woodwork within 9 inches should be protected by ¼-inch asbestos board covered with sheet metal. A dead air space of ¼-inch should be left between the protecting asbestos and the wood and a clearance of not less than ⅓ its diameter should be maintained between the pipe and the surface of such protection. Efficient spark arrest should be installed in funnel exhausts.

X–f. *Boilers.*—Donkey boilers or heating boilers should be installed and operated in accordance with provisions of the main rules.

X–g. *Electrical equipment.*—Electrical equipment should be in accordance with section VI.

X–h. *Ventilation.*—Ventilation should be provided in accordance with section IV.

X–i. *Fire-extinguishing equipment.*—Fire-extinguishing equipment should comply with the minimum requirements of the regulations.

X–j. *Auxiliaries.*—Gasoline auxiliaries are not recommended, but where used, they should be installed and operated in accordance with the provisions provided herein. Gasoline feed tanks for auxiliaries should be mounted on deck; but if necessary to install under deck (as in some cases on sailing craft) such tanks should be installed as required in section III–a.

X–k. *Operation.*—While the fire and explosion hazards of oils, such as are generally used on motor vessels are much less than those of gasoline and somewhat less than those of steaming oil, the fact remains that the dangerous atmospheric saturation point of 1¼ percent may obtain through careless handling of even high flash oil and the hazard of carrying a liquid fuel readily flammable under application of fire is always present.

X–l. *Hazard incident to leakage.*—For these reasons the same precautions as for gasoline should be observed against leakage into closed or partially closed compartments.

X–l–1. Cleanliness, and absence of flammable substance should be required in accordance with section IX–b–5 to IX–b–8.

X–l–2. Adequate ventilation of the engine compartment should receive attention in accordance with section IV.

X–l–3. Use of naked lights in bilges and poorly ventilated portions of machinery or tank spaces should be prohibited.

X–l–4. The rules of appendix A of the National Fire Protection Association regulations on marine fire hazards should be observed in entering fuel oil tanks for any purpose.

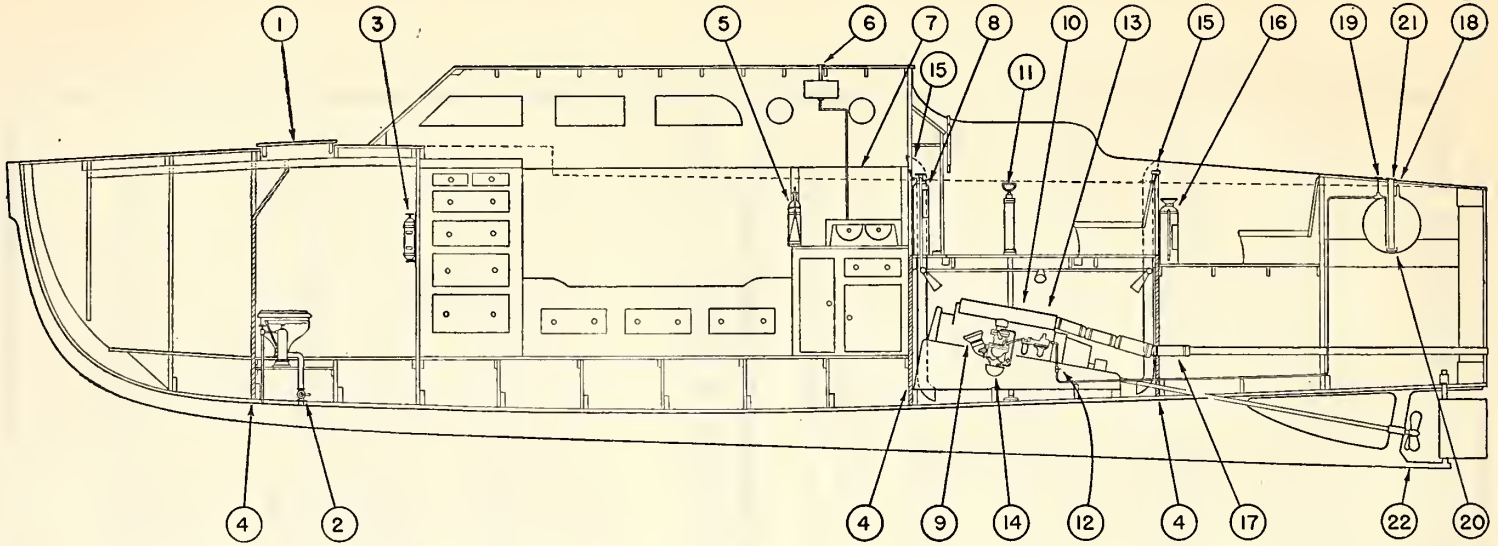
SAMPLE EXAMINATION QUESTIONS FOR OPERATOR'S LICENSE

I

1. What is the meaning of two short blasts of the whistle?
2. What signal would you display while at anchor during the night?
3. What is the rule concerning speed during foggy weather?
4. Suppose you see a red light on your starboard bow, what would you judge it to be and what would you do?
5. In keeping clear of another vessel what must you avoid doing?
6. What motorboats are included in Class 2?
7. What person must hold a motorboat operator's license? Under what conditions would a license as operator of a motorboat be subject to suspension or revocation?
8. Explain how a life preserver is worn and how it is adjusted.
9. Must fire extinguishers used on motorboats be approved?
10. Outline briefly the features of the fixed CO_2 system. What boats are required to be equipped with it?
11. What precaution would you take in regard to the bilges of the engine and fuel tank compartments of motorboats (except open boats) using as fuel any liquid of a volatile nature?
12. What should you do after refueling?
13. What precautions do you take with oily rags and waste?
14. What would you watch out for in regard to wiring?
15. When passengers are aboard, how must you handle your motorboat with regard to their safety?
16. Suppose a person falls overboard and is recovered in an unconscious state, how would you go about reviving him?

II

1. You are anchored in a fairway in a fog. What signals must you give and how often?
2. What is the meaning of one short blast on the whistle?
3. You are navigating in foggy weather. What signals must you give? What duration and at what intervals?
4. Suppose you see a red pennant displayed from a Coast Guard station, or a lighthouse, or yacht club, what would it mean to you?
5. In narrow channels, on which side shall vessels navigate, if safe and practicable?
6. What does the word "Motorboat" include according to the Motorboat Regulations?
7. Describe the lights carried on Class 3 motorboats.
8. What would you look for before purchasing a life preserver?
9. What type, size and number of fire extinguishers are accepted for use on motorboats? How are they operated?
10. If gasoline is spilled, what immediate steps should be taken?
11. What safety measures must be observed when refueling?
12. Before starting an engine, which is located in a cabin or other enclosed space, what would you do first?
13. Where should the vent from the gasoline tank terminate?
14. What precaution must be taken to prevent back-fire of the engines (except outboard motors) of motorboats, the construction of which, or the replacement of the engines of which was commenced subsequent to April 25, 1940?
15. When carrying passengers for hire, what provision must be made for one's safety?
16. Name the points of the compass.



Inboard profile of a cabin cruiser indicating safety installations and construction recommended to minimize the hazards most commonly found on powerboats.

1. Escape hatch big enough for adult to pass through in case of emergency.
2. Accessible seacock on toilet discharge which can be closed when cruiser is unattended.
3. Portable one quart carbon tetrachloride fire extinguisher.
4. Watertight bulkheads.
5. Portable 4-lb. carbon dioxide fire extinguisher.
6. Alcohol stove fuel tank arranged to fill through house deck.
7. Woodwork close to stove insulated and protected with sheet metal.
8. Manually operated fire extinguishing system using carbon dioxide, serving the engine compartment.
9. Flame Arrestor on air intake of engine carburetor to baffle any possible backfire.
10. Storage battery in ventilated lead-lined box, protected by cover to prevent tool or metal object falling on terminals and causing flash. (Located on stbd. side of motor.)
11. Fixed Navy-type bilge pump with strainer on suction pipe.
12. Shut-off valve on gasoline fuel line near carburetor.
13. Accessible seacock on intake for circulating water for cooling the engine.
14. Drip pan (closed) with drain connection to engine intake manifold.
15. Ventilating pipes running down all the way to bilge in all four corners of engine room, connected with cowl-type ventilators on deck.
16. Portable 2½-gallon foam type extinguisher.
17. Exhaust pipe insulated with asbestos where it passes through bulkhead.
18. Vent pipe leading outboard from gasoline tank, so gasoline vapors will discharge outside hull.
19. Shut-off valve on gasoline fuel line near tank with extension to deck for accessible operation.
20. Gasoline fuel tank with baffle plate and with filling pipe extending nearly to bottom of tank.
21. Deck fill connected to top of gasoline tank so any overflow will drain overboard.
22. Metal skeg shoe protecting propeller from striking obstructions.

TYPES of INSTALLATIONS

1

BEST INSTALLATION: Fill pipes firmly attached to tight deck plate. Fill pipe extends to bottom of tank, with well to form liquid seal. Vent pipe discharges to open air, away from all hull openings, hatches, doors, windows, ports, etc. Outboard end of vent screened.

2

FAIRLY GOOD INSTALLATION: Fill pipes firmly attached to tight deck plates, but not extended to bottom of tank, with liquid seal well. Tank can be exploded from ignited fill pipe. Vent led to open air with screened outboard end. Location of the vent outlet should be kept clear of all hull openings.

3

DANGEROUS INSTALLATION: Fill pipes firmly attached to deck plates, but vent pipes discharge all vapors to inside of boat. Fumes may be ignited by a backfire, a lit match, by electrical apparatus of any kind, or by a fire in the galley stove. Unless vent pipe is led to open air, a tight deck fill pipe is NO protection.

4

VERY DANGEROUS INSTALLATION: Both fill pipe and vent pipe end inside of hull. All vapors escape to interior of boat. Tank will overflow in filling and spill liquid fuel to bilge. Possible static spark from fill connections or funnel may ignite gasoline.

DO NOT place fill pipes inside of deck houses or cockpits.

DO NOT use small diameter tubing for vents. They will cause bubbling and spilling at the fill pipes.

FILLING INSTRUCTIONS

1. Fuel tanks should be properly installed and vented.
2. Fueling should be completed before dark except in emergencies.
3. Whenever boat is moored at service station for fueling:
   - A. Do not smoke, strike matches, or throw switches.
   - B. Stop all engines, motors, fans, and devices liable to produce sparks.
   - C. Put out all lights and galley fires.
4. Before starting to fuel:
   - A. See that boat is moored securely.
   - B. Close all ports, windows, doors and hatches.
   - C. Ascertain definitely how much additional fuel the tanks will hold.
5. During fueling:
   - A. Keep nozzle of hose, or can, in contact with fill opening to guard against possible static spark.
   - B. See that no fuel spills get into hull or bilges.
6. After fueling is completed:
   - A. Close fill openings.
   - B. Wipe up ALL spilled fuel.
   - C. Open all ports, windows, doors and hatches.
   - D. Permit boat to ventilate for at least 5 minutes.
   - E. See that there is no odor of gasoline in the engine room or below decks before starting machinery or lighting fire.
   - F. Be prepared to cast off moorings as soon as engine starts.

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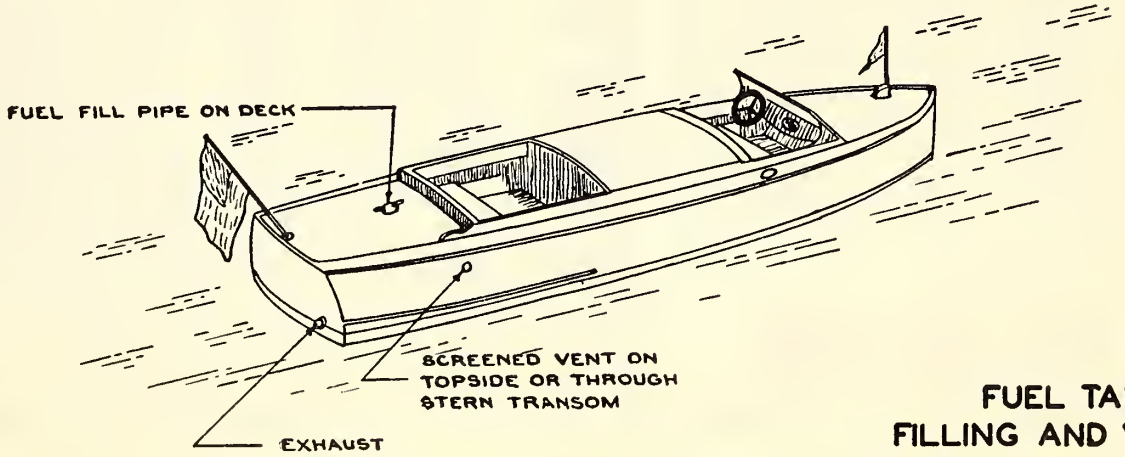
RUNABOUT



FUEL TANK
FILLING AND VENTING

(Reprinted from a publication of the National Fire Protection Association)

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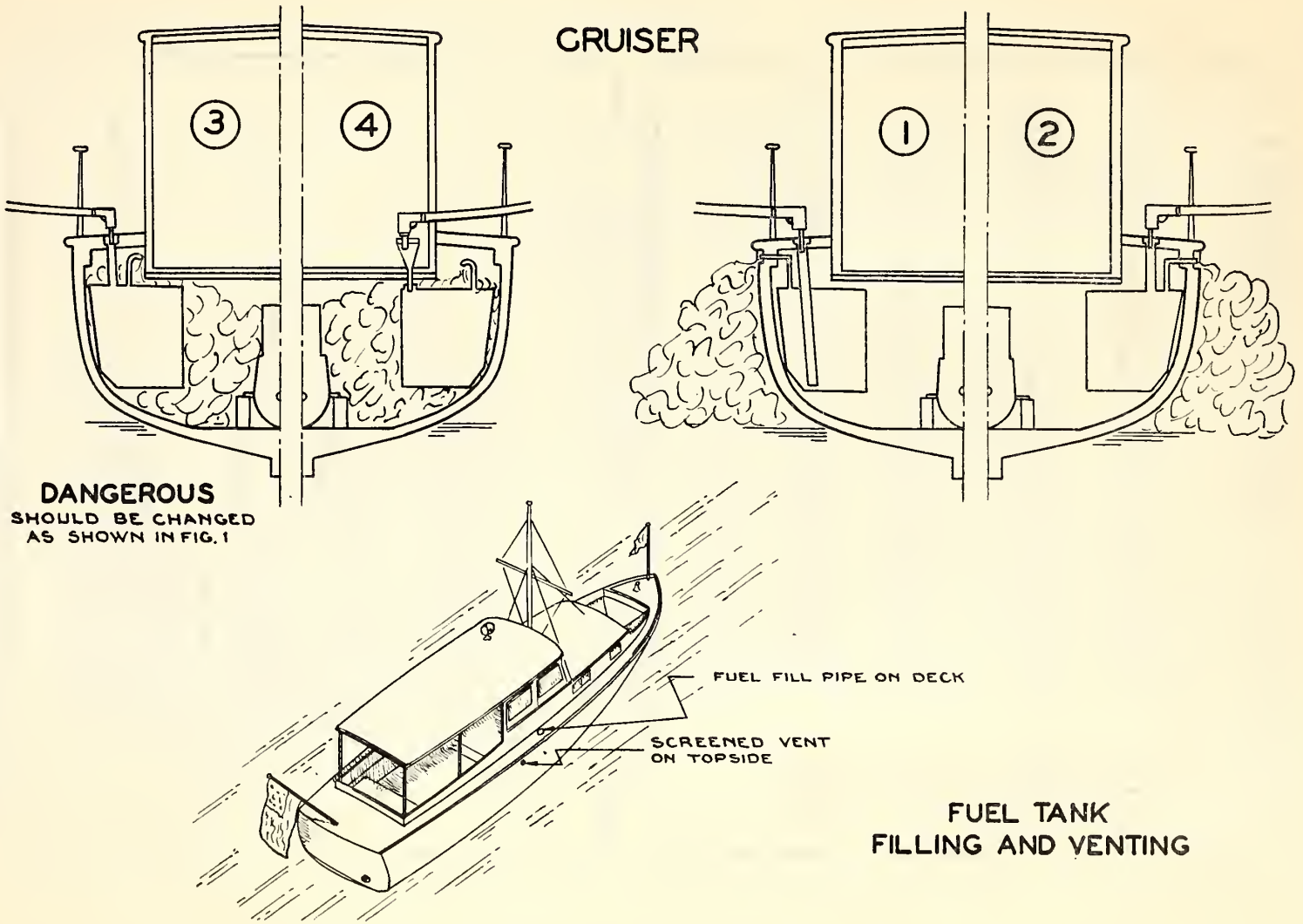

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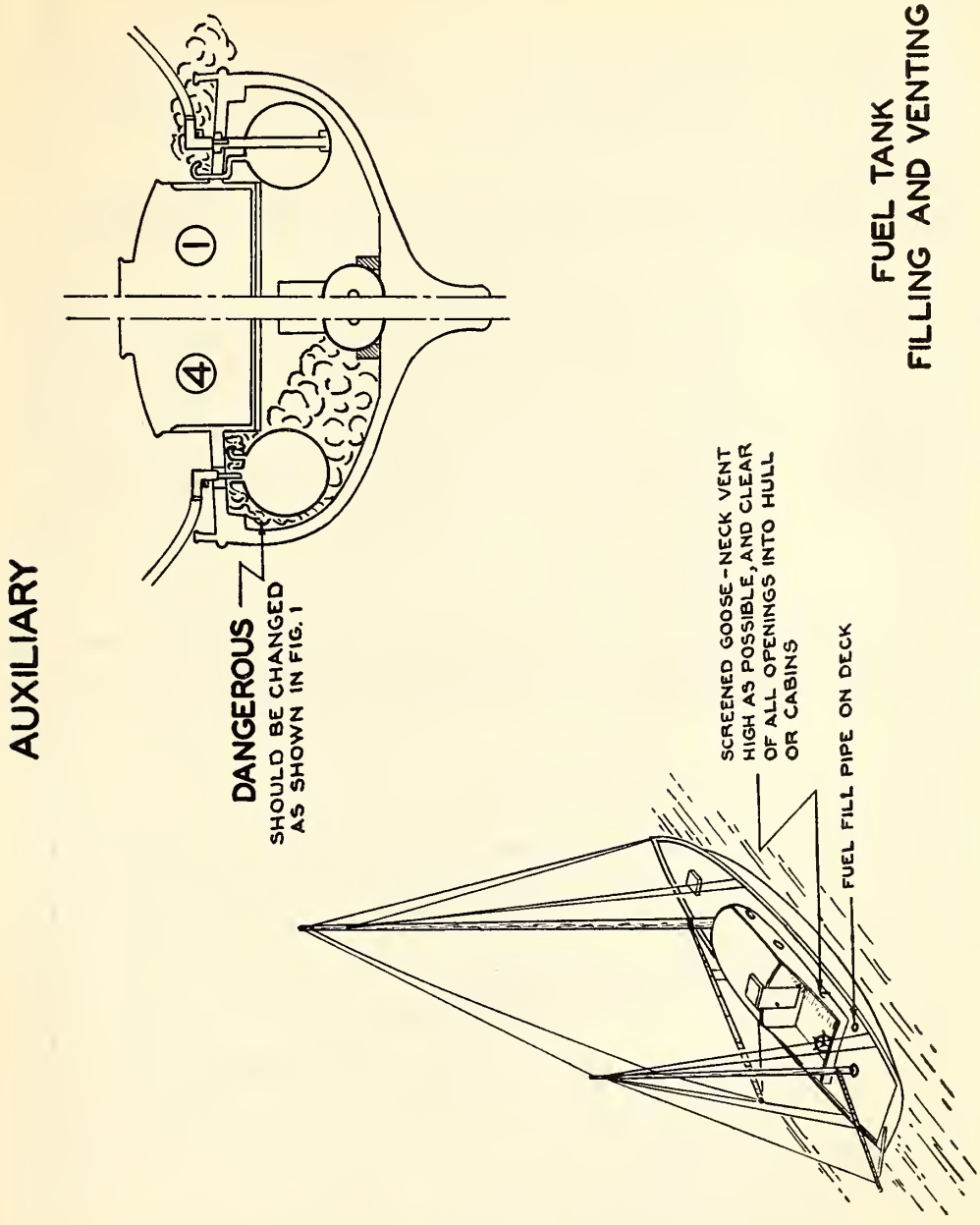

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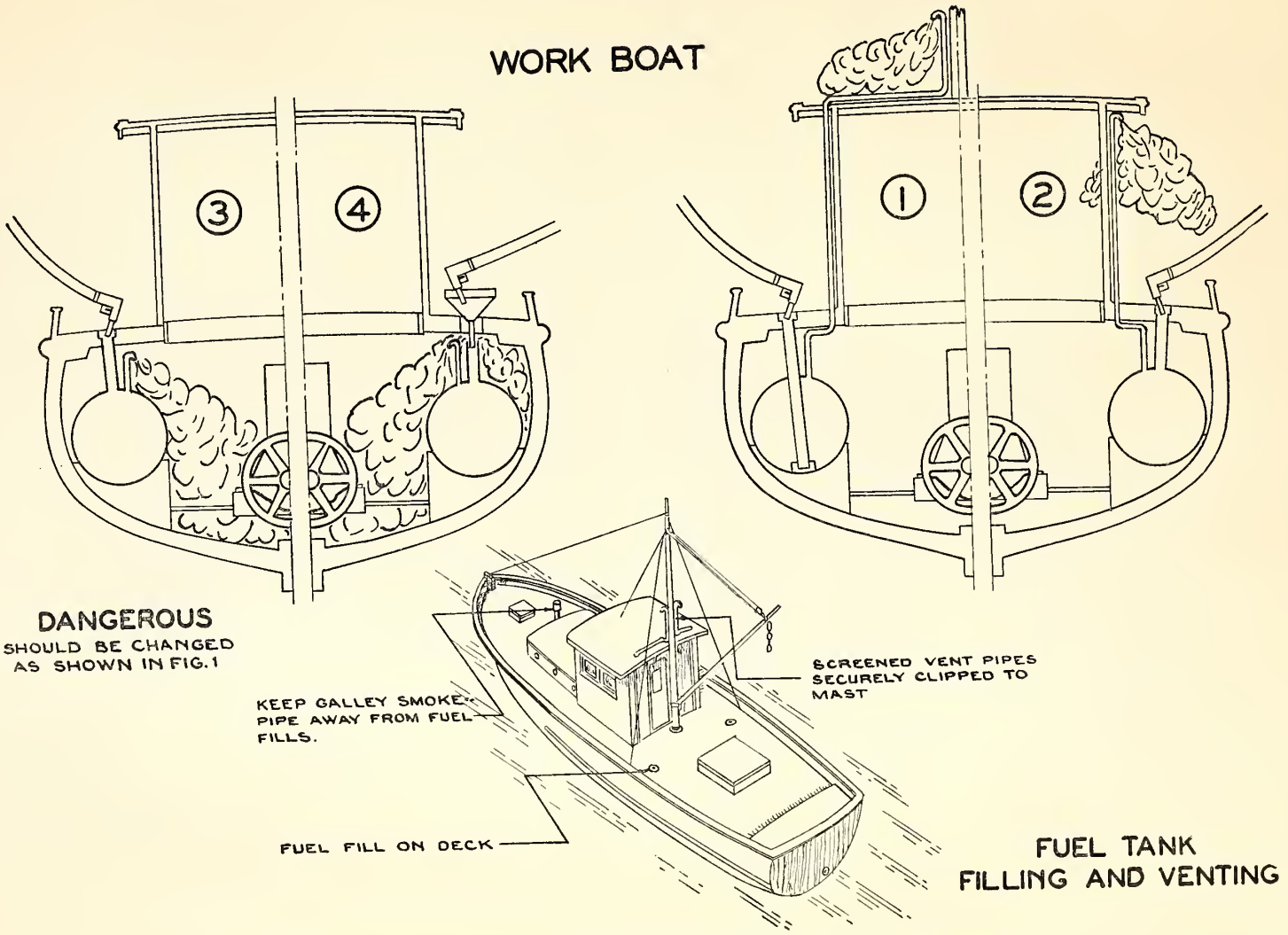

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Chicago, Ill	U. S. Local Inspectors, 1103 U. S. Courthouse
Detroit, Mich	U. S. Local Inspectors, 428 Federal Bldg.
Duluth, Minn	U. S. Local Inspectors, 311 Federal Bldg.
Grand Haven, Mich	U. S. Local Inspectors, Federal Bldg.
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Milwaukee, Wis	U. S. Local Inspectors, 468 Federal Bldg.
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Seventh District

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Honolulu, T. H	U. S. Local Inspectors, Federal Bldg.
Juneau, Alaska	U. S. Local Inspectors, Federal Bldg.
Los Angeles, Calif	U. S. Local Inspectors, Post Office and Customs House, San Pedro, Calif.
Portland, Oreg	U. S. Local Inspectors, 1005 Failing Bldg.
Seattle, Wash	U. S. Local Inspectors, 603 Federal Bldg.

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